QUME®

User's Guide for the HyperFlex™ High-Capacity, Flexible Disk Drive

for IBM PC/XT/AT, PS/2 Model 30,
or IBM-Compatible Systems

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The Company with Peripheral Vision.

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QUME Corporation
500 Yosemite Drive
Milpitas, CA 95035

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Warranties, Notices, and Instructions

Warranties, Notices, and Instructions

WARRANTIES

Limited Warranty on Hardware

QUME Corporation warrants the HyperFlex drive, subsystem housing and power supply, host adapter, and cabling against defects in materials and workmanship for a period of one (1) year from the date of original retail purchase.

If you discover a defect, QUME will, at its option, repair, replace, or refund the purchase price of the product at no charge to you provided you return it during the warranty period, transportation charges prepaid, to the authorized QUME dealer or distributor within the country of original retail purchase. (You can obtain additional information from QUME directly at the address printed in this manual.) Please attach your name, address, telephone number, a description of the problem, and a copy of the bill of sale bearing the appropriate QUME serial numbers as proof of date of original retail purchase, to each product returned to warranty service.

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NOTICES AND INSTRUCTIONS

Safety Standards

This drive complies with product safety standards for the most current revision of Underwriters Laboratories, Inc. (UL) specification UL 478 and the Canadian Standards Association (CSA) specification C22.2 No. 154-M1983 and changes.

Instructions Regarding FCC Compliance

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications of Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- **Reorient the receiving antenna.**
- **Relocate the computer with respect to the receiver.**
- **Move the computer away from the receiver.**
- **Plug the computer into a different outlet so that the computer and receiver are on different branch circuits.**

The use of cables other than the shielded interface cables or the equivalent specified in this manual will invalidate the FCC Certification of this disk drive and may cause interference levels which exceed the limits established for this device. If necessary, the user should consult the dealer or an experienced radio/ television technician for additional suggestions.

The Federal Communications Commission has prepared a booklet entitled "How to Identify and Resolve Radio-TV Interference Problems" which may be helpful to you. This booklet (stock number 004-000-00345-4) may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

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Product Revisions

QUME cannot guarantee that you will receive notice of revisions to the software described in this manual.

Important Safety Instructions

1. Read all of these instructions.
2. Save these instructions for later use.
3. Follow all warnings and instructions marked on the Product.
4. Unplug the Product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Use a damp cloth for cleaning.
5. Do not use the Product near water.
6. Do not place the Product on an unstable cart, stand, or table. The Product may fall, causing it to be seriously damaged.
7. Slots and openings in the cabinet and the back or bottom are provided for ventilation to ensure reliable operation of the Product and to protect it from overheating. These openings must not be blocked or covered. The openings should never be blocked by placing the Product on a bed, sofa, rug, or other similar surface. The Product should never be placed near or over a radiator or heat register. The Product should never be placed in a built-in installation unless proper ventilation is provided.
8. The Product should be operated from the type of power source indicated on the rating plate. If you are not sure of the type of power is available, consult your dealer or local power company.

9. The Product is equipped with a three-wire grounding type plug, a plug having a third (grounding) pin. This plug will only fit into a grounding-type power outlet. This is a safety feature. If you are unable to insert the plug into the outlet, contact your electrician to replace your outlet with a grounding-type. Do not defeat the purpose of the grounding-type plug.
10. Do not allow anything to rest on the power cord. Do not locate the Product where persons will walk on the cord.
11. If an extension cord is used with the Product, make sure that the total ampere ratings on the Product and other products plugged into the extension cord do not exceed the extension cord ampere rating. Also, make sure that the total rating of all products plugged into the wall outlet does not exceed the ampere rating of the wall outlet.
12. Never push objects of any kind into the Product through cabinet slots as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock. Never spill liquid of any kind on the Product.
13. Except as described elsewhere in this manual, refer all servicing to qualified service personnel.

14. Unplug the Product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
    a. When the power cord or plug is damaged or frayed.
    b. If liquid has been spilled into the Product.
    c. If the Product has been exposed to rain or water.
    d. If the Product does not operate normally when the operating instructions are followed. Adjust only those controls that are covered by the operating instructions, since improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the Product to normal operation.
    e. If the Product has been dropped or the cabinet has been damaged.
    f. If the Product exhibits a distinct change in performance, indicating a need for service.

Introduction

Introduction

Congratulations! The HyperFlex high-capacity, flexible disk drive you've purchased is one of the quality products produced by QUME Corporation. The HyperFlex drive is designed to work with the IBM PC, PC-XT, PC-AT, PS/2 Model 30, and IBM PC compatibles that have at least 256 kilobytes of main memory.

Preface:
About This Manual

Preface: About This Manual

The HyperFlex User's Guide should be read when you purchase, install, or use your drive for the first time. It is designed to familiarize you with the drive and provides detailed steps to get the drive working with your computer. This manual covers both the 12-MB and 24-MB versions of HyperFlex.

NOTE ▸

The illustrations in this manual depict the 24-MB drive; the 12-MB drive's faceplate is slightly different, but operation is identical.

Chapter 1 describes the types of HyperFlex drives available, the components comprising the drive system, installation requirements, and how the drive is used for storage.

Chapter 2 provides step-by-step instructions for installing the HyperFlex hardware into your system. Procedures for both internal and external drives are discussed.

Chapter 3 describes how to install the HyperFlex software by creating an installation diskette for a hard-disk system, dual-floppy system, or single-floppy system. Also included are booting instructions and a procedure for creating a DOS partition for the HyperFlex drive.

Chapter 4 tells you how to use the HyperFlex drive. Information on understanding the drive's LED indicators and handling disks is provided.

Chapter 5 gives you troubleshooting information and tells you what action to take under specific problem conditions.

The **Appendices** provide additional information.

Chapter 1:
About the HyperFlex Drive

Chapter 1:
About the HyperFlex Drive

The HyperFlex drive is an intelligent, 5.25-inch, half-height, flexible disk drive. This drive offers all the convenience, portability, and security of a floppy disk drive as well as the higher speed and storage capacity of a hard disk.

Included with the HyperFlex drive is a half-card, small computer system interface (SCSI) host adapter, which gives your IBM PC the SCSI port to connect the HyperFlex drive. Up to seven SCSI drives can be daisy-chained to this SCSI port, including the HyperFlex drive and many other SCSI hard disk drives. For compatibility information about other SCSI drives, please contact your authorized dealer or QUME's Technical Support Group (see Chapter 5).

The 5.25-inch, high-capacity, flexible disks can store up to 20 megabytes of data, the equivalent of 10,000 pages of information. You can organize data by project, case, department, or time period. You can consolidate all your favorite software on one disk. And you can pull out a disk and easily take it with you or mail it without fear of damaging the data. If security is important, you can store your disks in a safe place.

INTERNAL AND EXTERNAL HyperFlex MODELS

There are three HyperFlex models available:

- **The internal HyperFlex drive, installed inside the computer**

- **The HyperFlex Dual-Drive Subsystem, positioned outside the computer in its own enclosure capable of housing two HyperFlex drives or one HyperFlex drive and a Winchester**
- **The HyperFlex Low-Profile Subsystem in a single-drive, compact enclosure**

Each can be configured with a HyperFlex drive which uses 24-MB disks (HF24) or 12-MB disks (HF12). The 24-MB drive can also read, but not write, to the 12-MB disks. (The PC must be rebooted when changing between 24- and 12-MB disks to inform DOS of the new disk type.)

Each HyperFlex model affects your personal computer differently. Take a minute to read the following section for the specific drive you've purchased.

The Internal HyperFlex Drive

This model is inserted into your present system where the existing drive slots are located. The internal drive is the same size as a standard, half-height, 5.25-inch floppy disk drive and can be inserted in the same slot.

You need two things to use this drive:

- **A vacant slot for the drive**

You may already have a vacant slot in your system or you may be able to remove a standard floppy disk drive to make room.

- **A large enough internal power supply to run the add-in model**

This isn't a problem if you have an IBM PC-XT or PC-AT. See the section on Requirements for Your HyperFlex in this chapter for more information on power supply requirements.

The External HyperFlex Subsystem

If you don't have a vacant slot or a large enough power supply, you should have an external HyperFlex model. An external drive sits next to your present system. It contains one or two drives and a dedicated power supply in one chassis.

THE HyperFlex COMPONENTS

The available HyperFlex configurations and accessories are illustrated in Figure 1-1. HyperFlex consists of five basic parts:

- **The drive, equipped with its own built-in intelligent controller, which lets the drive communicate using the SCSI protocol**
- **A SCSI host adapter card, which allows HyperFlex to talk to your system**
- **12- or 24-megabyte flexible disks**
- **A signal cable: a flat ribbon cable for internal drives or a round cable for external drives**
- **The installation and utility software on a standard 5.25-inch floppy diskette**
- **Mounting brackets and hardware for the PC-XT and PC-AT**
- **User's guide**

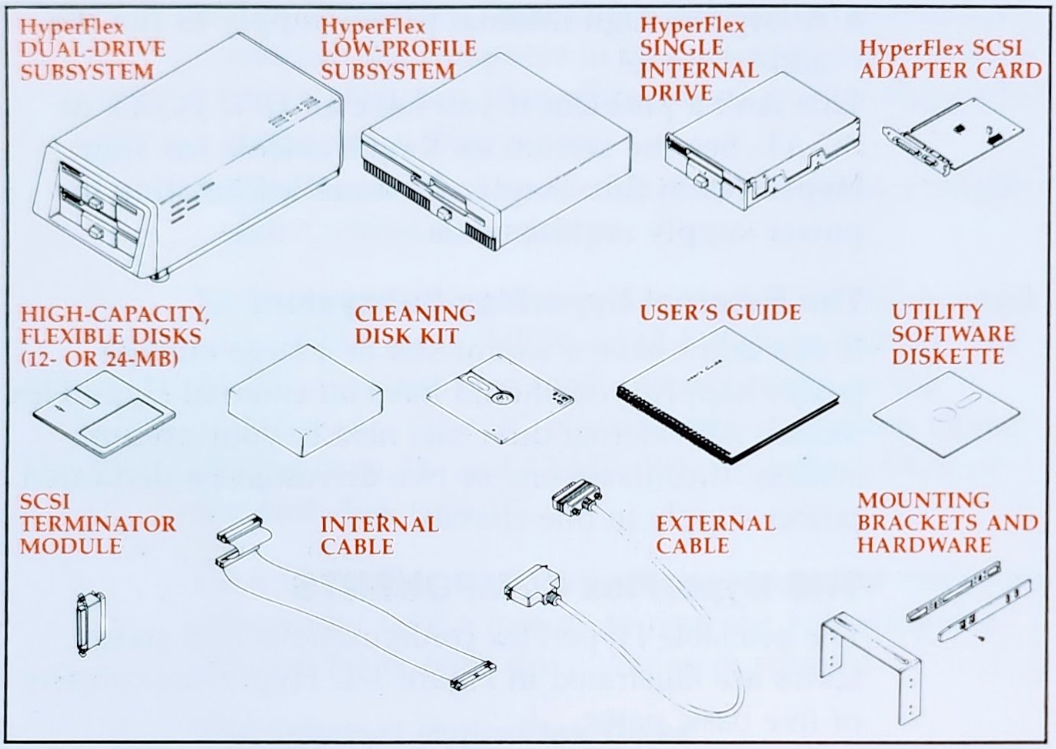

HyperFlex DUAL-DRIVE SUBSYSTEM
HyperFlex LOW-PROFILE SUBSYSTEM
HyperFlex SINGLE INTERNAL DRIVE
HyperFlex SCSI ADAPTER CARD
HIGH-CAPACITY, FLEXIBLE DISKS (12- OR 24-MB)
CLEANING DISK KIT
USER'S GUIDE
UTILITY SOFTWARE DISKETTE
SCSI TERMINATOR MODULE
INTERNAL CABLE
EXTERNAL CABLE
MOUNTING BRACKETS AND HARDWARE

Figure 1-1 HyperFlex Configurations and Accessories

REQUIREMENTS FOR YOUR HyperFlex

Before you start to install your HyperFlex, be sure that you have met all of the appropriate requirements for physical installation, power, system memory, software, compatibility, and networking as described in the following subsections.

Physical Requirements

You need one, 5.25-inch, half-height slot for each internal HyperFlex drive. Each drive measures 1⅝ × 5¾ × 8 inches. See Chapter 2 for detailed instructions.

There are no physical installation requirements for the external HyperFlex models. They sit next to your computer and are enclosed in their own chassis. The dual-drive subsystem measures 8 inches wide × 5¼ inches high × 14 inches deep. The low-profile subsystem measures 10.5 inches deep × 10 inches wide × 2.5 inches high.

Power Requirements

If you have an IBM PC-XT or PC-AT, the standard power supplies of these systems will support the internal HyperFlex drive without any changes.

If you have an IBM PC, the standard 63-watt power supply will *not* support the internal HyperFlex drive. Ask your dealer to assist you in selecting the power supply upgrade that you need to operate the HyperFlex drive in your IBM PC or compatible or use the external HyperFlex subsystem which has its own power supply and does not require more system power.

System Memory Requirements

To operate the SCSI adapter card, your system must have at least 256 kilobytes of main memory. The basic input/output system (BIOS) read-only memory (ROM) on the adapter card occupies 10 kilobytes of system memory.

Software Requirements

You will need to create an installation diskette that contains the DOS system files (Version 3.00 or higher) and the HyperFlex utilities. Chapter 3 has instructions on installing the HyperFlex software.

Compatible Computers

HyperFlex is designed for the IBM PC, PC-XT, PC-AT, and PS/2 Model 30 as well as for IBM PC compatibles. If you have an IBM PC-compatible system, the BIOS and hardware in the system must be IBM compatible. See your computer dealer if you have any questions about compatibility.

Networking Systems

Your HyperFlex does not function in all networking systems. For more information on using HyperFlex in a network, please contact QUME Technical Support, (408) 727-8899.

USING THE HyperFlex DRIVE FOR STORAGE

You can use the HyperFlex drive for either primary or secondary storage. You can install the HyperFlex drive as a bootable device—the drive that runs DOS—or as a nonbootable device.

Whether you use the HyperFlex drive as primary or secondary storage, you are advised to make each high-capacity disk a bootable device; that is, copy the DOS system files onto each disk that you format. In this way, the HyperFlex drive will always be ready to boot, even if something should happen to prevent your hard disk (if you have one) or floppy disk from booting.

Instructions for installing HyperFlex hardware are located in Chapter 2. Instructions for informing your system of the new configuration are in Chapter 3. Three typical HyperFlex drive configurations are described in the following subsections.

Primary Storage: HyperFlex Drive Bootable

In this configuration, the system has one or more floppy drives, no hard disk, and you want to make the HyperFlex drive the bootable device. In other words, the system will access DOS from the HyperFlex drive when you start up the system, not from drive A as had previously been the case.

To do this, you will have to remove the floppy disk from drive A (or unlatch the door of the drive). Then, when you turn on the system, it will load DOS from the HyperFlex drive. If you connect a hard disk to the SCSI adapter card, the HyperFlex drive will be bootable only if its SCSI address is lower than that of the hard disk (see page 29).

Primary Storage: HyperFlex Drive Not Bootable

In this configuration, the system has one or more floppy drives, and you want to keep floppy drive A as the bootable device. In other words, you'll put a DOS diskette in A when you start up the system, just as you have been doing.

Secondary Storage: HyperFlex Drive Not Bootable

In this configuration, the system has a hard disk and one or more floppy drives. Your existing hard disk must remain the primary storage and bootable device. In this case, the HyperFlex drive becomes secondary storage and a nonbootable device.

Chapter 2: Installing the HyperFlex Hardware

Chapter 2:
Installing the HyperFlex Hardware

This chapter provides step-by-step instructions for installing the HyperFlex hardware into your system. Installation procedures for both the internal and the external HyperFlex drives are discussed here.

When you install HyperFlex, you go through six basic steps. These steps are:

1. Checking the jumpers on the SCSI adapter card
2. Removing the cover of the PC system unit
3. Inserting the adapter card into the system unit
4. Checking the SCSI address jumpers and terminating resistors on the HyperFlex drive's printed circuit board
5. Using the correct SCSI termination technique
6. Inserting the HyperFlex drive into the system unit
    a. Installing the internal HyperFlex drive in an IBM-compatible system
    b. Installing the internal HyperFlex drive in a PC or PC-XT system unit
    c. Installing the internal HyperFlex drive in the PC-AT system unit
7. Replacing the cover on the PC system unit

To install an *internal* HyperFlex drive into your system, go through all seven of the steps just listed. You may first have to remove an existing floppy disk drive from the system to make room for the HyperFlex drive.

To install an *external* HyperFlex subsystem, you don't have to do step 6, because this model sits next to your system and not inside it. After step 7, you simply attach the HyperFlex signal cable to the system and plug in the HyperFlex subsystem. This is described in the final section of this chapter.

If the addition of the new HyperFlex drive is going to change your system configuration, such as by removing a floppy disk drive, be sure to reset the DIP switches on the system board (for a PC or XT) or rerun the SETUP program (for an AT) to notify the system of this change. Refer to the operations manual that came with your system for information about resetting the DIP switches. Refer to your DOS manual for instructions on running the SETUP command.

CHECKING THE JUMPERS ON THE SCSI ADAPTER

This step is just a check to be sure that the jumpers on the SCSI adapter card that comes with the installation kit are set the way they were at the factory. Shipping can sometimes displace jumpers, so now is a good time to be sure these jumpers are set properly.

A jumper is on when the plastic jumper block is inserted over *both* pins of the jumper. A jumper is off when the plastic jumper block is inserted over only one pin of the jumper or is removed completely.

Figure 2-1 illustrates the location of the jumpers on the adapter card. Table 2-1 lists the correct settings for these jumpers when the system has a hard disk and when the system does not.

If you need to change a jumper setting, use the following procedures.

To remove a jumper block:

1. Carefully grasp the plastic jumper block with your fingers.
2. Pull up to remove the jumper block.
3. This jumper position is now off.

To install a jumper block:

1. With your fingers, position the plastic jumper block over the two jumper pins at the jumper position you wish to turn on. Take care not to bend the pins.
2. Press the plastic jumper block down firmly until it is seated on the switch block.
3. This jumper position is now on.

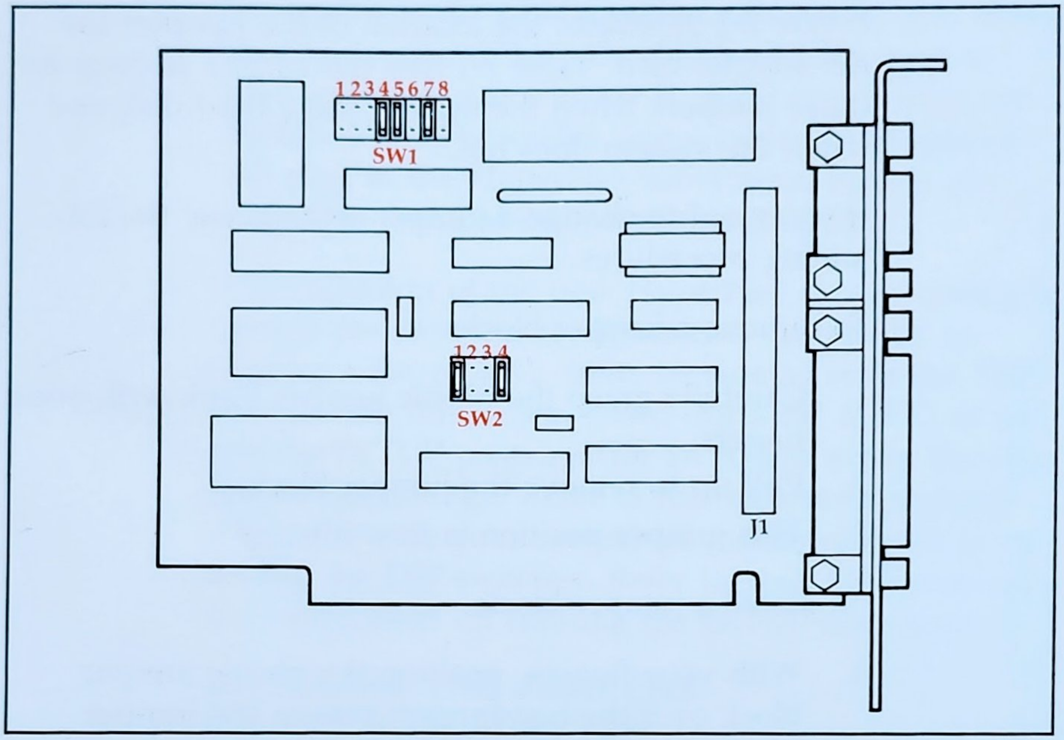


Figure 2-1 Locating the Jumpers on the SCSI Adapter Card

Table 2-1 Jumper Settings for SCSI Adapter Card

Jumper	Description	Jumper Setting		
Block SW1				
1	Reserved	Off		
2	Retries enabled	Off		
3	Parity disabled	Off		
4	Reserved	On*		
5	DMA channel 1	On*		
	DMA channel 3	Off		
6	DMA enabled	Off		
	Base port address:	320H	330H	340H
7		On	On*	Off
8		On	Off*	On
Block SW2 (BIOS ROM address)**		**No Hard Disk**	**Hard Disk**	
1		On	On*	
2		On	Off*	
3		Off	Off*	
4		On	On*	

*Default (factory) setting.
**The BIOS ROM on the SCSI adapter card occupies 10 kB (10,240 bytes) of system memory space.

If the host adapter BIOS ROM addresses in Table 2-1 conflict with other hardware installed in your system, you must choose another host adapter BIOS ROM address from Table 2-2.

Table 2-2 Alternative BIOS ROM Addresses

Seg	8 k EPROM	2 k RAM	8 K RAM	SW1	SW2	SW3	SW4
C000	0000-1FFF	2000-27FF	2000-3FFF	On	On	On	On
C400	0000-1FFF	2000-27FF	2000-3FFF	On	On	On	Off
C800	0000-1FFF	2000-27FF	2000-3FFF	On	On	Off	On*
CC00	0000-1FFF	2000-27FF	2000-3FFF	On	On	Off	Off*
D000	0000-1FFF	2000-27FF	2000-3FFF	On	Off	On	On*
D400	0000-1FFF	2000-27FF	2000-3FFF	On	Off	On	Off*
D800	0000-1FFF	2000-27FF	2000-3FFF	On	Off	Off	On*
DC00	0000-1FFF	2000-27FF	2000-3FFF	On	Off	Off	Off*
E000	0000-1FFF	2000-27FF	2000-3FFF	Off	On	On	On*
E400	0000-1FFF	2000-27FF	2000-3FFF	Off	On	On	Off
E800	0000-1FFF	2000-27FF	2000-3FFF	Off	On	Off	On
EC00	0000-1FFF	2000-27FF	2000-3FFF	Off	On	Off	Off
F000	0000-1FFF	2000-27FF	2000-3FFF	Off	Off	On	On**
F400	0000-1FFF	2000-27FF	2000-3FFF	Off	Off	On	Off**
F800	0000-1FFF	2000-27FF	2000-3FFF	Off	Off	Off	On
FC00	0000-1FFF	2000-27FF	2000-3FFF	Off	Off	Off	Off**

* IBM/AT optional ROM scan range.
** IBM BIOS ROM.

The following address ranges are used by IBM:

- **C800:0000-C800:1FFF—IBM Fixed Disk Adapter (IBM/XT)**
- **CC00:0000-CC00:1FFF—IBM Network Adapter**
- **F000:0000-F000:FFFF—IBM System ROM**

REMOVING THE COVER OF THE PC SYSTEM

These instructions are written for the IBM PC system. If you have an IBM-compatible PC, you may have to follow a slightly different procedure to remove the cover. Refer to the documentation that came with your system or contact your computer dealer for more information.

1. Turn off all power switches, including the system unit, monitor, printer, and any other peripherals.
2. Unplug the system unit and all other peripherals and options from the wall outlet.
3. Use a flat-blade screwdriver and loosen the cover mounting screws counterclockwise and remove them.

NOTE ▶

If you have an AT system, you may first need to remove the back panel by pulling it away from the fastener strips that hold it in place.

4. Remove the cover by sliding it away from the rear and toward the front until it can go no farther. Then tilt the front of the cover up and remove it from the base of the system unit.
5. You are now ready to insert the SCSI adapter card.

INSERTING THE SCSI ADAPTER CARD INTO THE SYSTEM UNIT

1. Select an empty expansion slot for the adapter card. (If you have an external HyperFlex subsystem, choose a slot closest to where the drive unit will sit.)

NOTE ►

The adapter card will work in any empty slot, 8- or 16-bit.

2. Use a flat-blade screwdriver or a 3⁄16-inch nutdriver and remove the screw that holds the expansion slot cover in place. Turn the screw counterclockwise. Save the screw for use in the adapter card restraining bracket.
3. Hold the adapter card by the top corners and firmly press it into any available expansion slot until it is seated. On internal HyperFlex drives only, make sure the ribbon cable is firmly attached to connector J1 on the adapter card, *with the red edge of the flat cable up.* (See Figure 2-1 for the location of connector J1.)
4. Align the hole in the adapter card retaining bracket with the hole in the rear panel of the system unit. Use the screw from the expansion slot cover to tighten the adapter bracket into place. Start the screw clockwise and then tighten it with a flat-blade screwdriver or 3⁄16-inch nutdriver.

CHECKING THE SCSI ADDRESS

If you are installing more than one HyperFlex drive, or other drive(s) which will connect to the SCSI adapter, each drive must have a unique SCSI address from 0 to 6. SCSI address 7 is reserved for the host computer. HyperFlex drives are set at the factory to address 0. If you have to change the SCSI address on a HyperFlex drive, use the following procedure:

1. Choose the SCSI address you wish to set from the list in Table 2-3.

Table 2-3 Jumpers/Switches for SCSI Addresses

	HF24			HF12
		Jumpers		DIP
SCSI Address	**ID0**	**ID1**	**ID2**	**Switches**
0	Off	Off	Off	1
1	Off	Off	On	2
2	Off	On	Off	3
3	Off	On	On	4
4	On	Off	Off	5
5	On	Off	On	6
6	On	On	Off	7
7	Reserved for host adapter			

2. If you have a Low-Profile Subsystem, the SCSI address can be changed by pressing the up/down switches next to the SCSI address window (see Figure 2-4). If you have a Dual-Drive Subsystem, the factory settings will be address 0 for the lower drive and address 1 for the upper drive. To change them, remove the subsystem cover as described in Appendix A and change the jumpers or DIP switches per the following steps.
3. If you have a 24-MB drive (HF24), the drive has a 6-pin connector (R9) on the back of the drive's printed circuit board (PCB) as shown in Figure 2-2. Set the jumper positions at ID2, ID1, and ID0 to correspond to the settings listed for the SCSI address you have chosen.

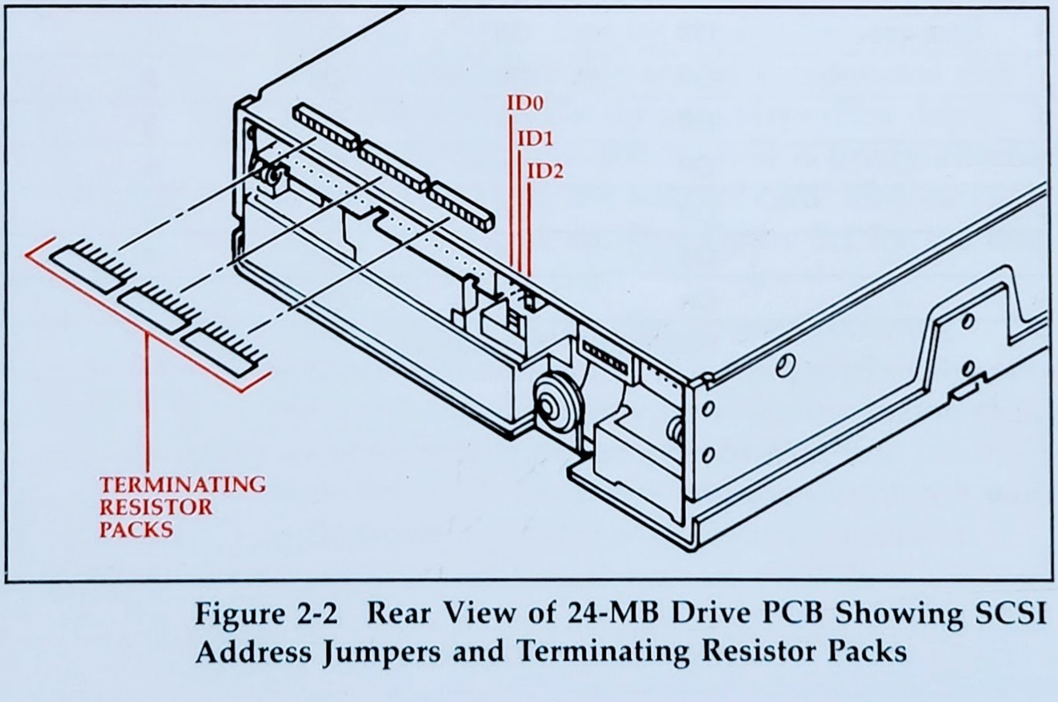


Figure 2-2 Rear View of 24-MB Drive PCB Showing SCSI Address Jumpers and Terminating Resistor Packs

4. If you have a 12-MB drive (HF12), the drive has an 8-position DIP switch as shown in Figure 2-3. Note from Table 2-3 that SCSI address 0 is selected by turning switch 1 on, address 1 is selected by turning switch 2 on, etc. Only *one* switch must be in the ON position. Turn on the correct DIP switch for the SCSI address you have chosen.

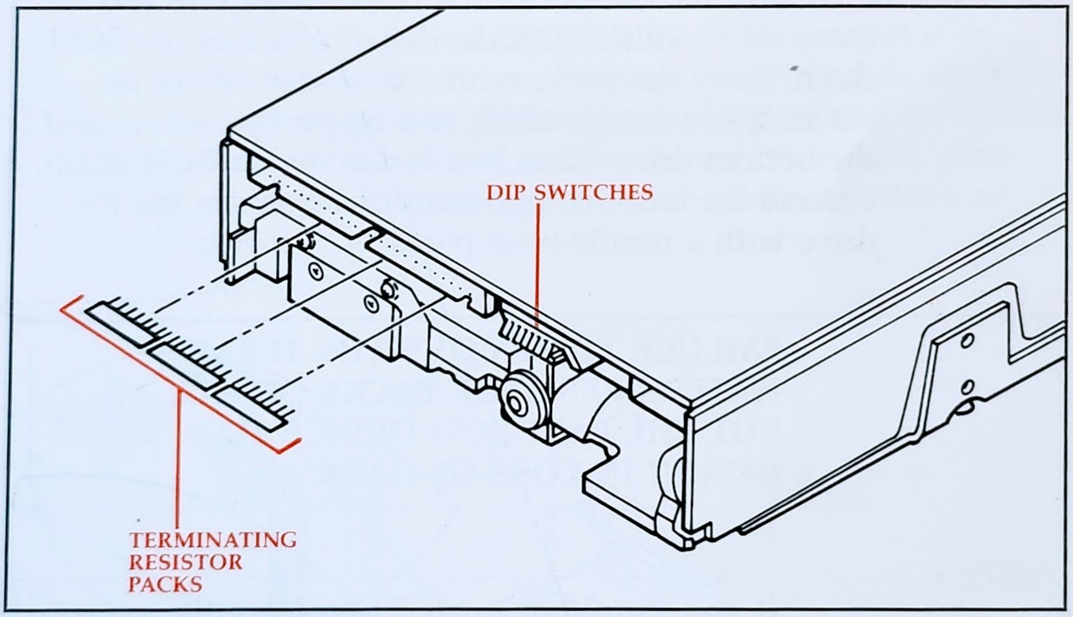


Figure 2-3 Rear View of 12-MB Drive PCB Showing DIP Switches and Terminating Resistor Packs

SCSI TERMINATION TECHNIQUES

SCSI Termination on Internal HyperFlex Drives

Both the HF12 and HF24 models of the internal HyperFlex drive have terminating resistor packs installed on the drive. On the HF24, these packs are labeled RP5, RP6, and RP7. On the HF12, the packs are labeled RP9, RP10, and RP12. These packs are located on the edge of the PCB in each drive (see Figures 2-2 and 2-3). Terminating resistor packs are only needed on the last device attached to the ribbon cable. They must be removed from *all other internal* SCSI devices (such as a hard disk), except the last device on the SCSI chain.

If you are installing just one HyperFlex drive and there are no other SCSI devices attached to the SCSI chain, leave the packs on the HyperFlex drive in place. If you are installing two HyperFlex drives and the bottom drive is the last device on the SCSI chain, remove the terminating resistor packs from the *top* drive with a needle-nose pliers.

WARNING ▶

FAILURE TO REMOVE THE TERMINATING RESISTOR PACKS ON ALL BUT THE LAST SCSI DEVICE MAY RESULT IN LOSS OF DATA.

NOTE ▶

If you should ever need to replace the terminating resistor packs, be sure to reinsert them in the correct way. Pin one is called out on the circuit board. Inserting the packs backward may cause loss of data to the disk.

SCSI Termination on External HyperFlex Subsystems

The external HyperFlex subsystems (both the dual and low-profile subsystems) contain drives which have no resistor packs installed. This is true for both the HF24 and HF12 models. In place of the terminating resistor packs, a terminator module is used.

When the external drive is the last SCSI device in the SCSI chain, you must insert a SCSI terminator module (see Figure 2-4) in line with the SCSI connector on the back of the drive. The terminator module simply plugs into place. (Note that the HyperFlex Low-Profile Subsystem has a second connector on its back plate which could be connected to an additional drive or drives.)

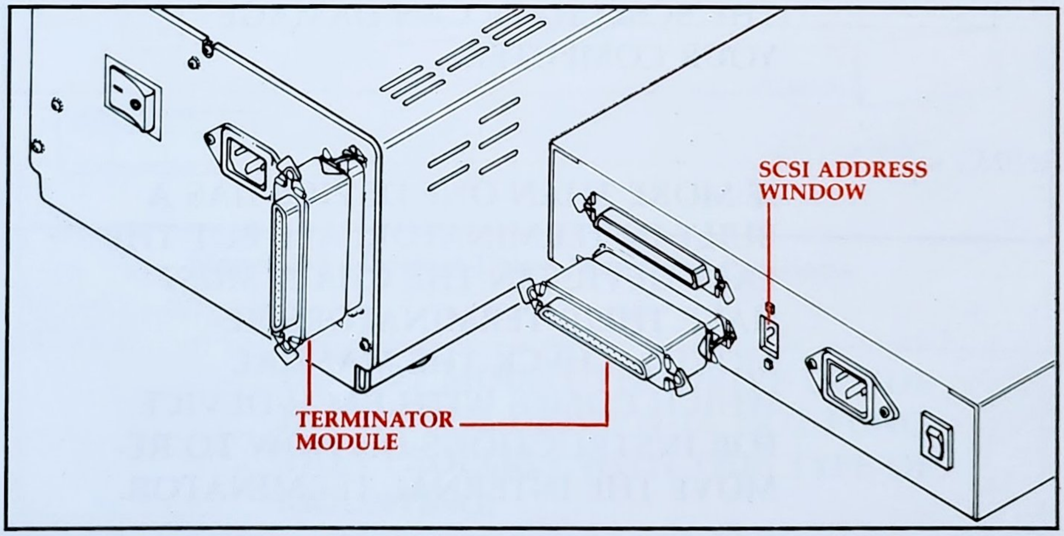


Figure 2-4 SCSI Terminator Module Connected to Back of External Subsystem

It is important that you determine whether or not any other SCSI devices you wish to use on the SCSI chain have built-in terminators. Refer to the manual that came with the device or the dealer from whom you purchased the device. Remember, only the last drive on the SCSI chain can have a termination device.

WARNING ▶

IF A SCSI DEVICE YOU WISH TO USE HAS A BUILT-IN TERMINATOR, IT SHOULD BE PLACED AT THE END OF THE CHAIN. DO *NOT* CONNECT ANOTHER TERMINATOR TO THIS DEVICE. ONLY ONE DEVICE WITH A BUILT-IN TERMINATOR CAN BE CONNECTED IN THIS MANNER. HAVING MORE THAN ONE TERMINATOR IN THE SCSI CHAIN CAN DAMAGE YOUR COMPUTER.

WARNING ▶

IF MORE THAN ONE DEVICE HAS A BUILT-IN TERMINATOR, ALL BUT THE LAST DEVICE IN THE CHAIN *MUST* HAVE THEIR TERMINATORS REMOVED. CHECK THE MANUAL WHICH COMES WITH EACH DEVICE FOR INSTRUCTIONS ON HOW TO REMOVE THE INTERNAL TERMINATOR.

INSTALLING HyperFlex

The cover has now been removed from your system unit and you have installed the SCSI adapter card into the system unit. Now you are ready to install the HyperFlex drive itself. The drive can be mounted either horizontally (with the LEDs on the left side) or vertically (with the LEDs on top). (See Figure 2-5.) In either case, the angle between the front of the drive and the horizontal plane must not exceed +10 degrees or −5 degrees.

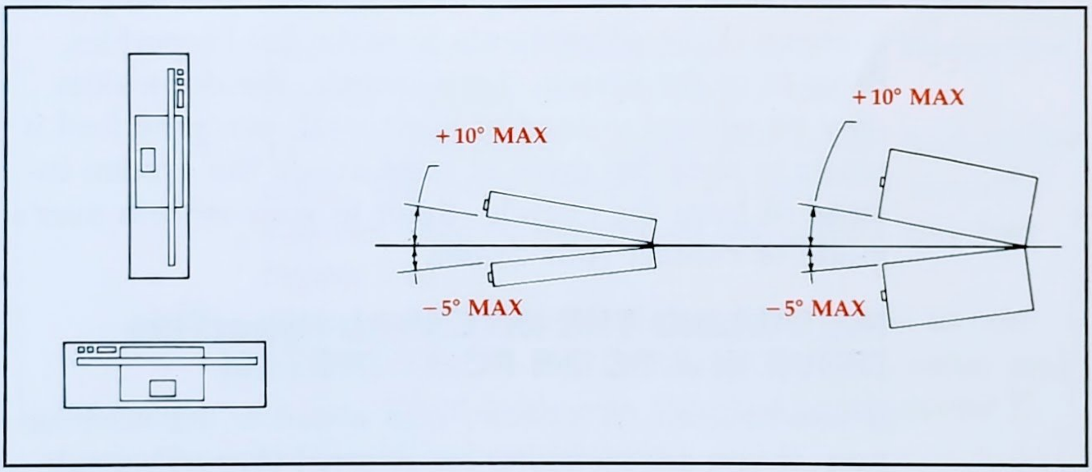


Figure 2-5 Correct Drive Mounting Positions

WARNING ►

DO NOT MOUNT THE DRIVE UPSIDE DOWN. THE DRIVE WILL NOT FUNCTION PROPERLY WITH THIS TYPE OF MOUNTING.

The instructions diverge at this point to cover the differences between internal and external drives and differences in the type of personal computer being used. The instructions are presented in the following order:

- **Installing the internal HyperFlex drive in an IBM-compatible system**
- **Installing the internal HyperFlex drive in a PC or PC-XT**
- **Installing the internal HyperFlex drive in a PC-AT**
- **Connecting the external HyperFlex subsystem to the system**

INSTALLING THE INTERNAL HyperFlex DRIVE IN AN IBM-COMPATIBLE SYSTEM

If you have an IBM-compatible system, you may have to make slight adjustments to make the HyperFlex drive fit in the system. For example, the drive slots may be vertical instead of horizontal; you may find it easier to slide the drive in from inside the system instead of from the outside. Refer to your system user's guide or contact your dealer.

INSTALLING THE INTERNAL HyperFlex DRIVE IN A PC OR PC-XT SYSTEM

If you have an AT system, skip ahead to the next section. If you are installing an external HyperFlex subsystem, go to the last section in this chapter. However, if you're installing an internal HyperFlex drive in your PC or PC-XT, you're in the right place. The cover is still off your system unit, and you are ready to install the new drive.

NOTE ▸

The PC-XT has drive mounts on one side of the drive only. The mounting brackets supplied with the HyperFlex drive must be used to support it adequately.

1. Select an empty half-height drive slot for each HyperFlex drive that you are installing.
2. You may have to remove a bezel or even a drive to make a slot (or slots) available for the HyperFlex drive(s). Refer to your user's guide for help.
3. From the front of the system, slide the HyperFlex drive(s) halfway into the empty slot.
4. Connect the power supply cable to the back of the drive. The cable connector is slightly D-shaped and can only be inserted in the correct way (see Figure 2-6).
5. Connect the free end of the ribbon cable to connector J1 on the back of the drive. (The other end of the ribbon cable was attached to connector J1 on the SCSI host adapter.)

Notice that the ribbon cable has two connectors. If you have only one drive, you can use either connector. The cable connector is keyed and can only be inserted in the correct way (see Figure 2-6). The red edge of the flat cable should be next to the outside edge of the drive.

NOTE ▸

If you are installing two drives, the drive attached to the end connector on the ribbon cable *must* be the device which contains the terminating resistor packs. (See the subsection on SCSI Termination Techniques in this Chapter.) On horizontally stacked drives, this is usually the bottom drive. The other drive must have the terminating resistors removed. See Figures 2-2 and 2-3 for the location of the terminating resistor packs on the adapter card.

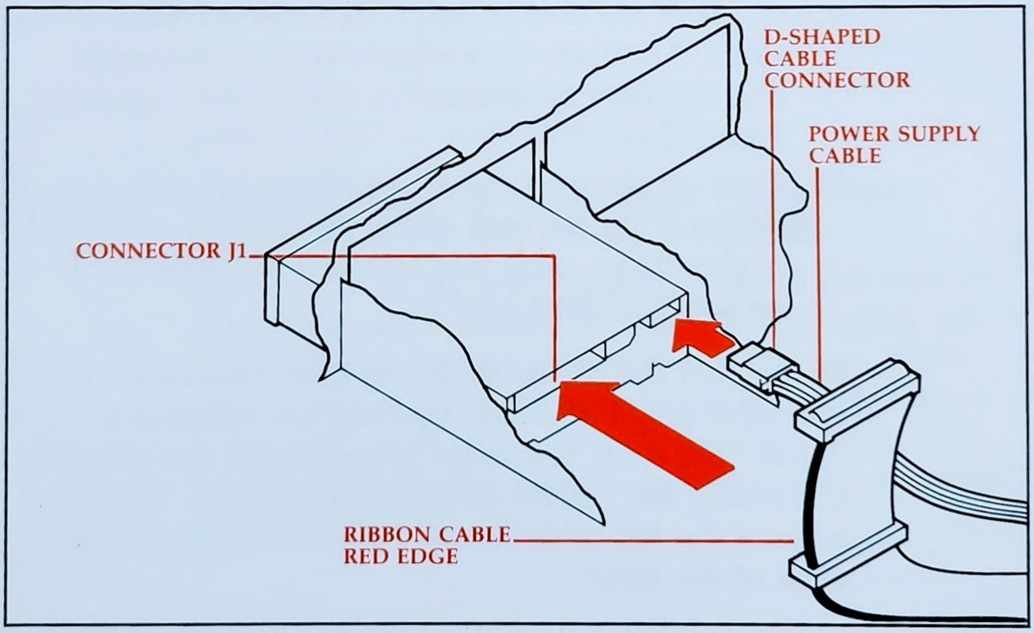


Figure 2-6 Inserting the HyperFlex Drive and Connecting the Internal Cables

6. Push the drive all the way into the empty slot.
7. Position the brackets you received with the installation kit over the HyperFlex drive(s) so that the long sides of the brackets face the top of the system unit (see Figure 2-7).

   The side(s) of the bracket(s) with the tabs should be against the wall that separates the PC's two drive slots. You should hear the brackets click into place when these tabs connect with the holes in the wall.

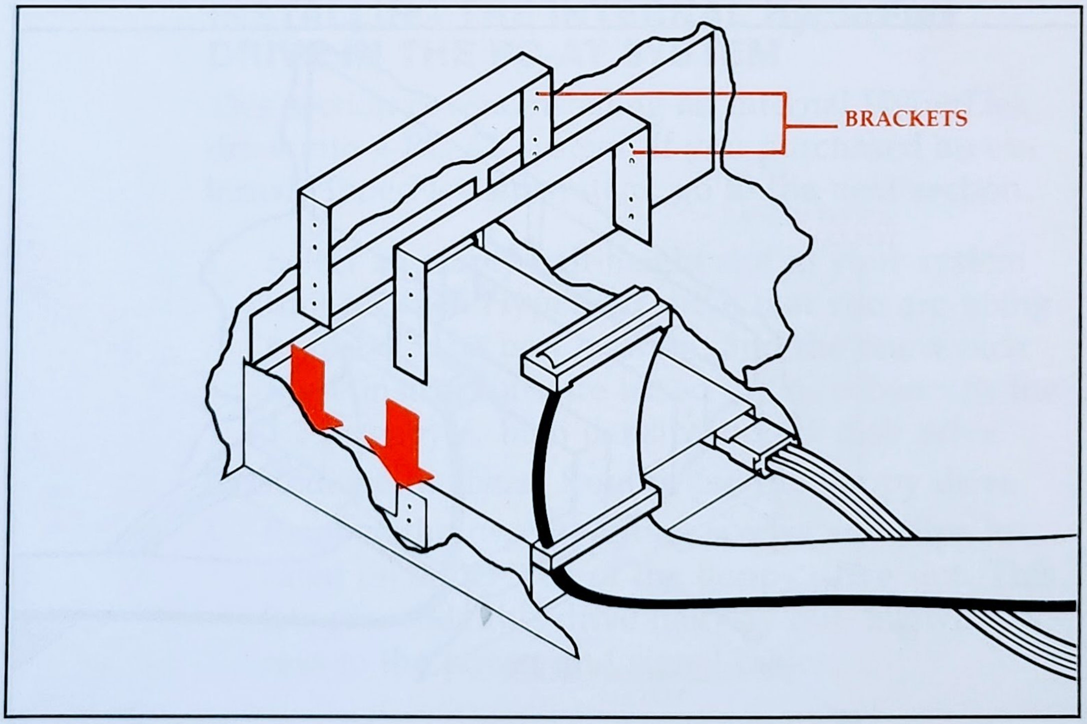


Figure 2-7 Positioning the Brackets and Securing the HyperFlex Drive

NOTE ►

Be sure that the drive's brackets rest between the HyperFlex drive and the system unit's mounting bracket. This ensures a tight fit. Notice how the bracket is slightly bent to fit in this way.

8. Align the mounting holes on the drive with those on the system unit's mounting bracket. Use the screws provided in the installation kit to secure the HyperFlex drive (see Figure 2-8).

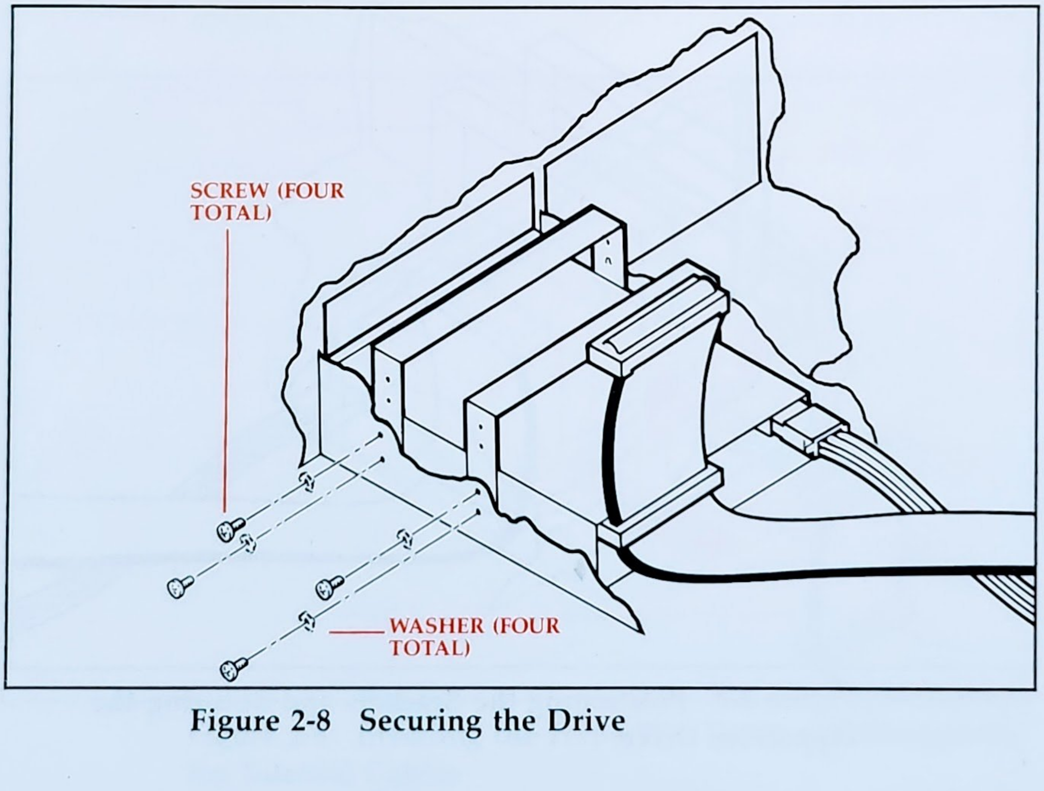


Figure 2-8 Securing the Drive

WARNING ▶

BE SURE TO USE ONLY THE SCREWS THAT COME WITH THE HyperFlex DRIVE. IF OTHER SCREWS ARE USED TO MOUNT THE BRACKET, AND THEY ARE TOO LONG, THESE SCREWS MAY DAMAGE THE DRIVE.

9. If you had to remove a full-height drive to install one HyperFlex drive, attach a half-height filler bezel (not included) to the empty half-slot.

INSTALLING THE INTERNAL HyperFlex DRIVE IN THE PC-AT SYSTEM

This section covers installing an internal HyperFlex drive into a PC-AT system. If you purchased an external HyperFlex subsystem, go to the next section.

1. Select an empty half-height slot in your system unit for each HyperFlex drive that you are going to install. The best location, and the one which these instructions are based upon, is beneath the 1.2-megabyte, high-density, floppy disk drive.
2. Remove the bezel from below the floppy drive.
3. Remove the two mounting screws and clips located on either side of the floppy drive slot. This lets you slide this drive halfway out, allowing access to the power and signal cables.

4. Use the mounting screws that come with the HyperFlex installation kit, *not* the screws that come with the mounting rail kit. Attach the mounting rails to each side of the HyperFlex drive (see Figure 2-9).

WARNING ▶

BE SURE TO USE ONLY THE SCREWS THAT COME WITH THE HyperFlex DRIVE. IF OTHER SCREWS ARE USED TO MOUNT THE BRACKET, AND THEY ARE TOO LONG, THESE SCREWS MAY DAMAGE THE DRIVE.

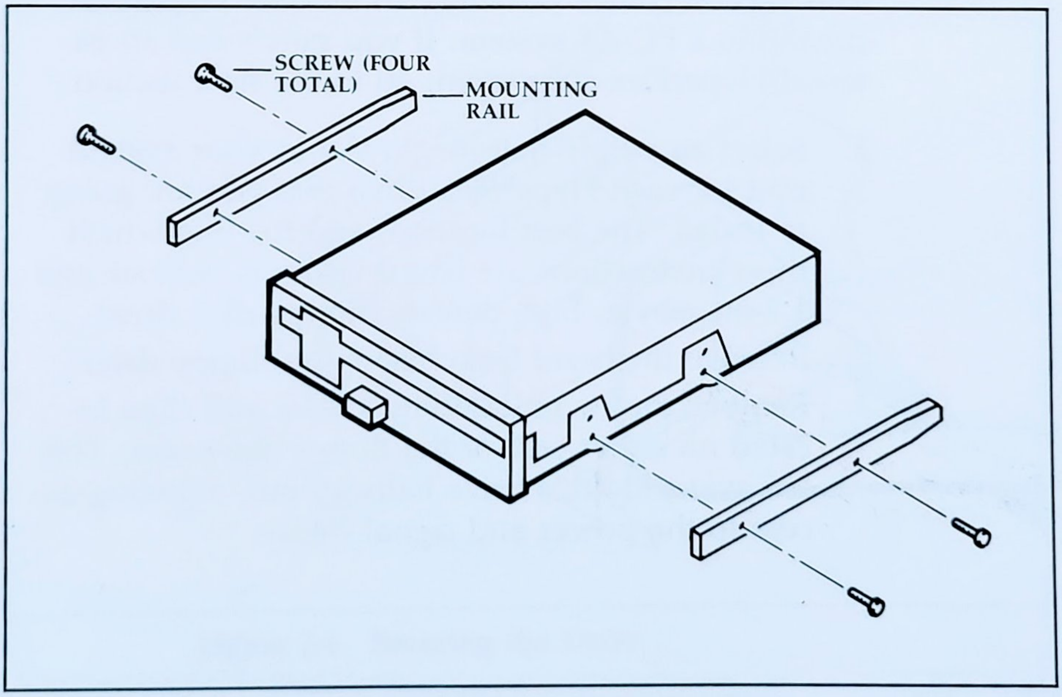


Figure 2-9 Attaching the Mounting Rails to the HyperFlex Drive

5. From the front of the system, slide the HyperFlex drive halfway into the empty slot.
6. Connect one of the available power supply cable connectors to the back of the drive. The cable connector is slightly D-shaped and can only be inserted in the correct way (see Figure 2-6).
7. Connect the free end of the ribbon cable to connector J1 on the back of the drive. (The other end of the ribbon cable was attached to connector J1 on the SCSI host adapter earlier.)

   Notice that the cable has two connectors. If you have only one drive, you can use either connector. The cable connector is keyed and can only be inserted in the correct way (see Figure 2-6).

NOTE ▶

If you are installing two drives, the drive attached to the end connector on the ribbon cable *must* be the device which contains the terminating resistor packs. (See the subsection on SCSI Termination Techniques in this chapter.) On horizontally stacked drives, this is usually the bottom drive. The other drive must have the terminating resistors removed. See Figures 2-2 and 2-3 for the location of the terminating resistor packs on the drive.

8. Push the 1.2-megabyte drive and the HyperFlex drive all the way into their slots.
9. Replace the two mounting screws and clips on either side of the 1.2-megabyte drive slot (see Figure 2-10).
10. Attach the mounting screws and clips to both sides of the HyperFlex drive slot (see Figure 2-10).

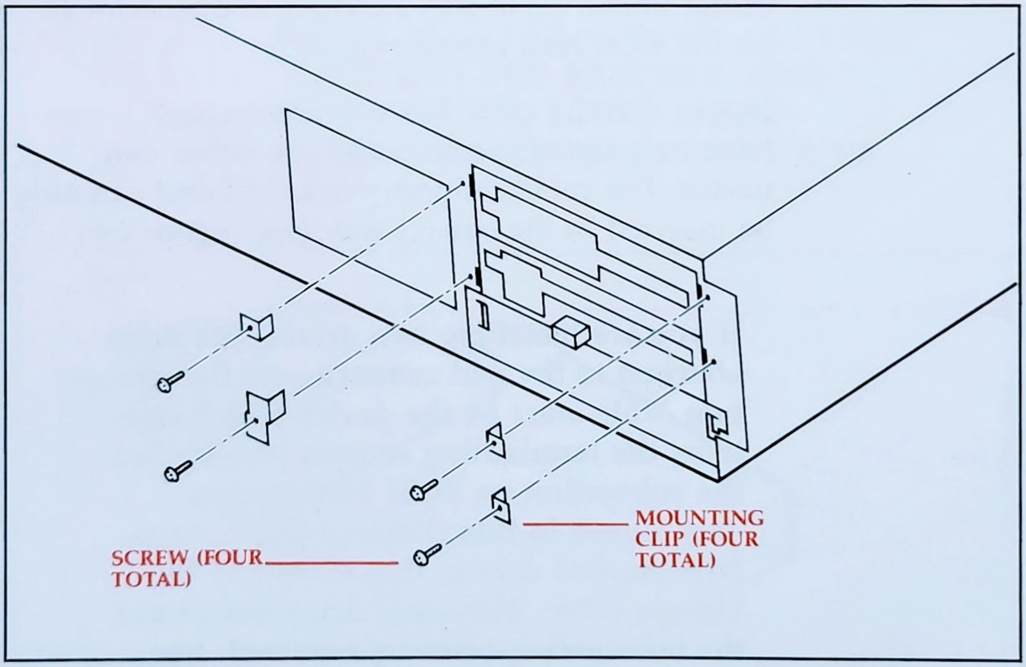


Figure 2-10 Attaching the Mounting Screws and Clips

REPLACING THE COVER OF THE PC

After the internal HyperFlex drives have been installed in your personal computer, replace the system unit's cover.

1. Tilt the cover to position it at an angle similar to that at which the cover was removed, then carefully slide the cover toward the rear of the unit until it is back in place.
2. When the cover is all the way back to the rear of the unit, align the cover screws with the threaded tabs and, with a flat-blade screwdriver, tighten them in a clockwise direction.
3. Reconnect all the cables that you disconnected earlier. Connect the system power cord to the system unit first, then to the wall outlet.

CONNECTING THE EXTERNAL HyperFlex SUBSYSTEM TO THE SYSTEM

The SCSI adapter card has been installed in your system unit and you have replaced the system unit's cover. Now you are ready to connect the external HyperFlex subsystem to your system.

1. Attach the large (50-pin) end of the round SCSI signal cable to the connector on the back of the external HyperFlex subsystem (see Figure 2-11). Press the wire clips into place to secure the cable head to the connector.

2. Attach the small (25-pin) end of the round SCSI signal cable to the SCSI adapter card connector at the rear of the system unit (see Figure 2-11). Secure the cable head connector to the adapter card connector.
3. Plug the power cord of the HyperFlex subsystem into an AC wall outlet.

The hardware is now completely installed.

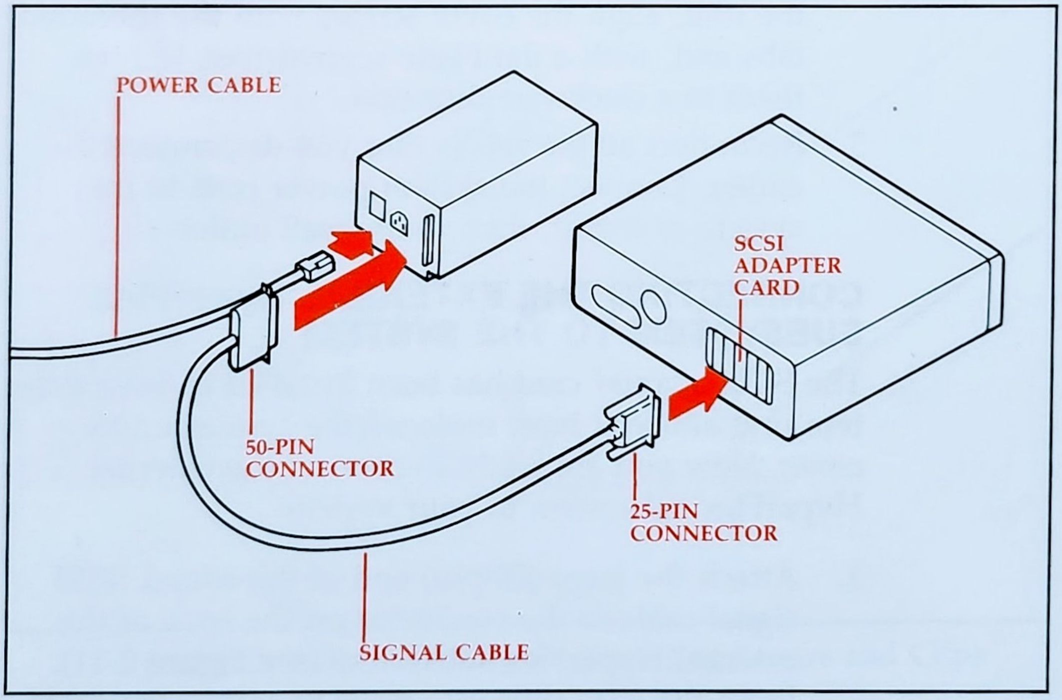


Figure 2-11 Connecting the External Power and Signal Cables

Chapter 3:
Installing the HyperFlex Software

Chapter 3:
Installing the HyperFlex Software

After the HyperFlex hardware has been installed (see Chapter 2), you are ready to install the HyperFlex software and prepare your disks for use.

To install the HyperFlex software, you will create an installation diskette, boot from the installation diskette, create a DOS partition, and then install the HyperFlex program files. Remember, you have to use DOS Version 3.00 or higher.

NOTE ►

You may also have to run the DOS SETUP program if you have an AT system. This program lets the system know that something has changed in the hardware configuration. The instructions in this chapter will let you know when it's time to do that.

TURNING ON THE SYSTEM

If you have installed an internal HyperFlex drive, you can turn on your system as you usually do. If you are using an external HyperFlex subsystem, use the following procedure.

NOTE ►

For optimum performance of your HyperFlex, if it has been exposed to cold or hot temperatures, let it stand for about 20 minutes until it comes to room temperature.

1. The system unit should be off.
2. With a hard disk system you probably already have the DOS files on the hard disk. If not, insert the DOS diskette into drive A and close the diskette drive cover.
3. With a floppy drive system, insert the DOS diskette into drive A and close the diskette drive cover.
4. Turn on the HyperFlex. The on/off switch is located on the back of the unit. The drive is off when the side of the switch marked with a zero (0) is down. The drive is on when the side of the switch marked with a one (1) is down (see Figure 3-1).

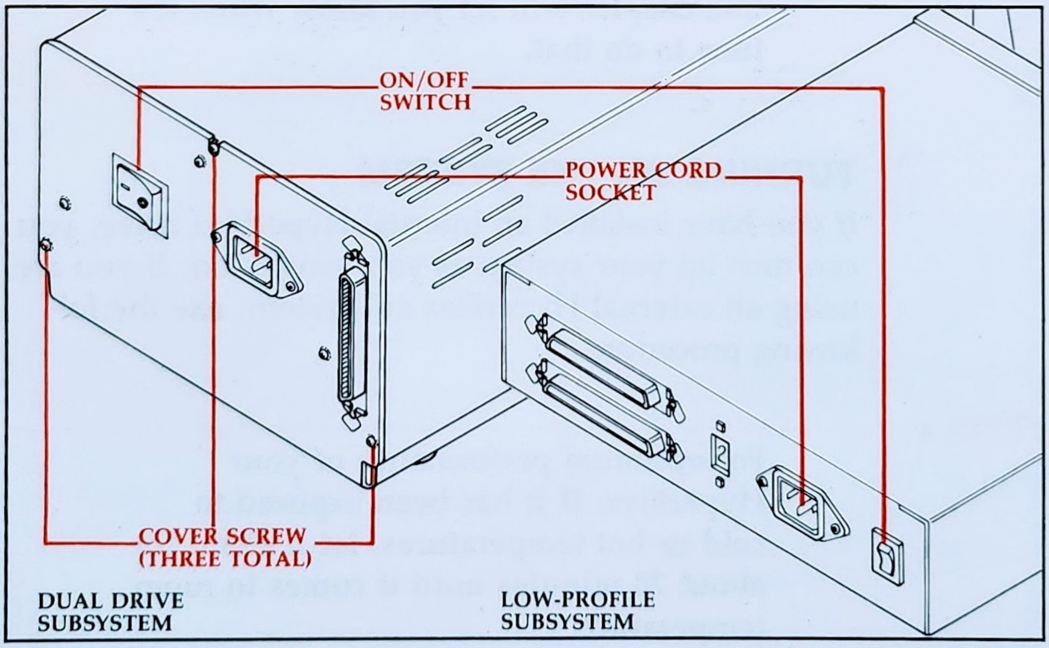


Figure 3-1 Back Panel of External HyperFlex Models

5. If a disk is already inserted, the red and green indicator lights on the front of the drive will go on, and upon successful completion of the self-test, the red indicator light will go off (see Figure 3-2).
6. Turn on your system unit.

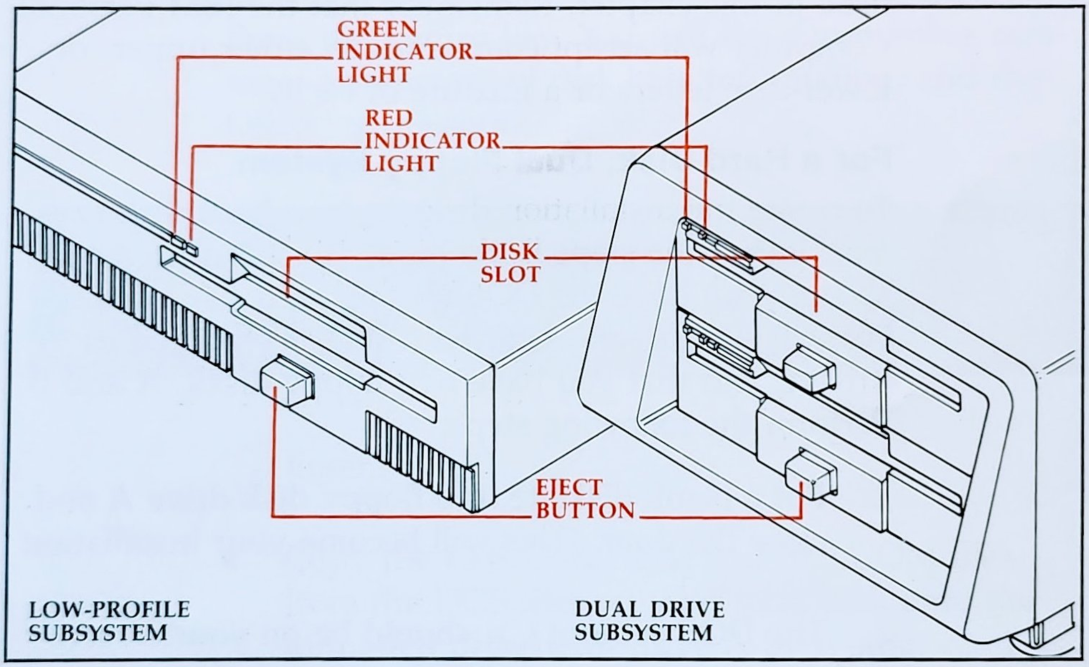


Figure 3-2 Front View of External HyperFlex Models

CREATING THE INSTALLATION DISKETTE

Before you can install the HyperFlex software, you have to create an installation floppy diskette that contains three sets of files: the DOS system files, the two DOS files SYS.COM and CHKDSK.COM, and the HyperFlex utility files.

This chapter gives the procedures to create an installation diskette on a hard disk system, a dual floppy system, and a single floppy system. Refer to the user's guide or DOS manual that comes with the system if you have any questions about the COPY, FORMAT, PATH, AUTOEXEC.BAT, and directory commands used in this chapter. Remember that the IBM Personal Computer will accept commands in either upper- or lower-case letters or a mixture of each.

For a Hard Disk, Dual Floppy System

To create the installation diskette on a hard disk system, follow the steps listed here. These instructions assume you have the DOS files on your hard disk. We will also assume your hard disk is specified as drive C and that you have two floppy disks, A and B. Perform the following steps:

1. Put a blank diskette into floppy disk drive A and close the door. (This will become your installation diskette.)
2. The DOS prompt C> should be on your screen.
3. Format the blank diskette using the DOS FORMAT command with the /S option. When you use the /S option, the operating system files are also copied from the hard disk drive to the new diskette. Type this:

   ```
   FORMAT A:/S
   ```

   and press the Return key. This message appears:

```
Insert new diskette for drive A:
and strike ENTER when ready
```

Press the Return key. You will see a formatting message, a summary of disk byte information, and the following question:

```
Format another (Y/N)?
```

Enter

N

4. Copy the CHKDSK.COM and SYS.COM files from the DOS files on your hard disk onto the formatted diskette in drive A by typing:

   COPY CHKDSK.COM A:

   Press the Return key. You will see a message that the file was copied. Type this:

   COPY SYS.COM A:

   Press the Return key. You will see a message that the file was copied.
5. Put the HyperFlex utility diskette into drive B.

6. Copy all the files from the HyperFlex utility diskette onto the installation diskette in drive A. You will have to change source drives first. At the C> prompt type this:

   ```
   B:
   ```

   Press the Return key, and you will be in drive B.
7. Copy the utility files by typing:

   ```
   Copy *.* A:
   ```

   and press the Return key. You will see a message acknowledging the files copied. See Appendix B for a listing of the utility files and a brief description of their functions.
8. Remove the HyperFlex utility diskette from drive B and put it away.

For a Hard Disk, Single Floppy System

To create the installation diskette on a hard-disk system with one floppy disk drive, follow the steps listed here. These instructions assume you have the DOS files on your hard disk. We will also assume your hard disk is specified as drive C and that your single floppy disk is drive A. Perform the following steps:

1. Put a blank diskette into floppy disk drive A and close the door. (This will become your installation diskette.)
2. The DOS prompt C> should be on your screen.

3. Format the blank diskette using the DOS FORMAT command with the /S option. When you use the /S option, the operating system files are also copied from the hard disk drive to the new diskette. Type this:

   ```
   FORMAT A:/S
   ```

   and press the Return key. This message appears:

```
Insert new diskette for drive A:
and strike ENTER when ready
```

   Press the Return key. You will see a formatting message, a summary of disk byte information, and the following question:

```
Format another (Y/N)? _
```

   Enter

   ```
   N
   ```

4. Copy the CHKDSK.COM and SYS.COM files from the DOS files on your hard disk onto the formatted diskette in drive A by typing:

   ```
   COPY CHKDSK.COM A:
   ```

   Press the Return key. You will see a message that the file was copied. Type this:

   ```
   COPY SYS.COM A:
   ```

   Press the Return key. You will see a message that the file was copied.
5. Remove the installation diskette from drive A and put it aside for the moment. Put the HyperFlex utility diskette, which comes with the HyperFlex installation kit, into drive A.
6. Copy the files from the HyperFlex utility diskette onto your hard disk for later transfer to the installation diskette. The easiest way to accomplish this is to copy the utility files to a subdirectory on your hard disk so that it will be convenient for you to erase them later.

   From the root directory on the hard disk, create a new subdirectory (call it Temp for the purposes of this example). Start off in the root directory. Type this:

   ```
   CD \
   ```

   and press the Return key. This puts you in the root directory.
7. Type this:

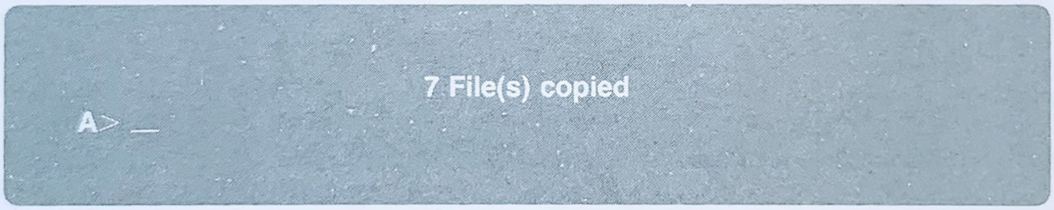
   ```
   MD \Temp
   ```

   and press the Return key. This will create a new subdirectory called Temp.

8. Type this:
   A:

   and press the Return key. You're in drive A. The prompt on your screen should be A>.
9. Type this:
   COPY *.* C: \Temp

   and press the Return key. Everything from the HyperFlex utility diskette in A will be copied into the Temp subdirectory. A list of the files being copied will appear. When the copying is complete, this message is displayed:



```
                    7 File(s) copied
A> _
```

10. To return to your hard disk, type:
    C:

    and press the Return key. The prompt C> will appear.
11. Remove the HyperFlex utility diskette from Drive A and put it away.

12. Place the installation disk back in drive A and copy the utility files from the HyperFlex subdirectory onto the installation disk. Type this:

    ```
    COPY \Temp\*.* A:
    ```

    and press the Return key. A listing of the files being copied will appear.

13. To erase the utility files in the Temp subdirectory, type:

    ```
    ERASE \Temp
    ```

    and press the Return key. The following message will appear:

```
Are you sure (Y/N)? _
```

    Type:

    ```
    Y
    ```

    and press the Return key. This will erase all the files within the Temp subdirectory.

14. To remove the Temp subdirectory itself, type:

    ```
    RD \Temp
    ```

    and press the Return key.

NOTE ▸

For PC-AT users: If you had to change any of the hardware in the system to install the HyperFlex drive—if you removed a floppy disk drive, for instance—now is the time for you to run the SETUP program. The SETUP program tells your computer what this hardware change is and what it needs to do differently because of it. Refer to the user's guide that comes with your AT system for instructions on running the SETUP program.

For a Dual Floppy System

The creation of the installation diskette for a dual floppy system is illustrated in Figure 3-3. Perform the following steps:

1. Put the DOS diskette into floppy disk drive A.
2. Put a blank diskette into floppy disk drive B. (This will be your installation diskette.)
3. Format the blank diskette using the DOS FORMAT command with the /S option. When you use the /S option, the operating system files are also copied from drive A to the new diskette. Type this:

```
FORMAT B:/S
```

and press the Return key. This message appears:

```
Insert new diskette for drive B:
and strike ENTER when ready
```

Press the Return key. You will see a formatting message, a summary of disk byte information, and the following question:

```
Format another (Y/N)? _
```

Enter

N

4. Copy the CHKDSK.COM and SYS.COM files from the DOS diskette in drive A onto the formatted diskette in drive B by typing:

   COPY CHKDSK.COM B:

   Press the Return key. You will see a message that the file was copied. Type in:

   COPY SYS.COM B:

   Press the Return key. You will see a message that the file was copied.

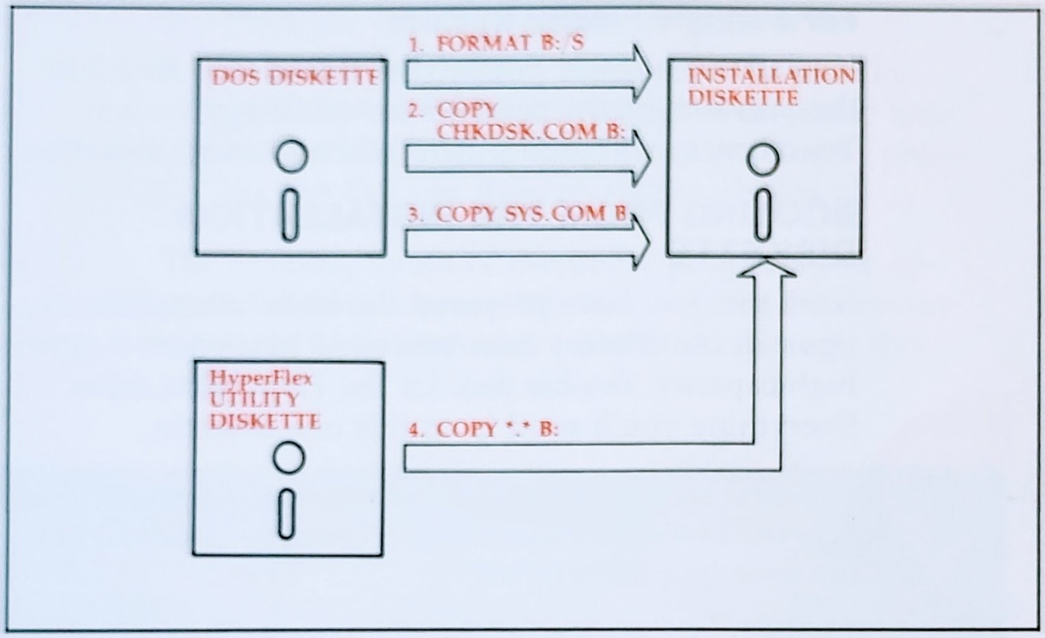


Figure 3-3 Creating the Installation Diskette

5. Take the DOS diskette out of drive A.
6. Place the HyperFlex utility diskette, which comes with the HyperFlex installation kit, into drive A.
7. Copy the files from the HyperFlex utility diskette onto the diskette in drive B. Type this:

   ```
   COPY *.* B:
   ```

   and press the Return key. You will see a message acknowledging the files copied. See Appendix B for a listing of the utility files and a brief description of their functions.
8. Remove the HyperFlex utility diskette from drive A and put away both the HyperFlex utility diskette and the DOS diskette.

For a Single Floppy System

If you have a single floppy disk drive, skip step 2 in the previous instructions for a dual-floppy system. Your system will prompt you when to swap diskettes.

BOOTING FROM THE INSTALLATION DISKETTE

Now that you have prepared the installation diskette, you can use it every time you need to prepare a new high-capacity, flexible disk for the HyperFlex drive. Everything you'll need is on this one diskette.

The next step is to insert a high-capacity, flexible disk into the HyperFlex drive and reboot the system from the new installation diskette:

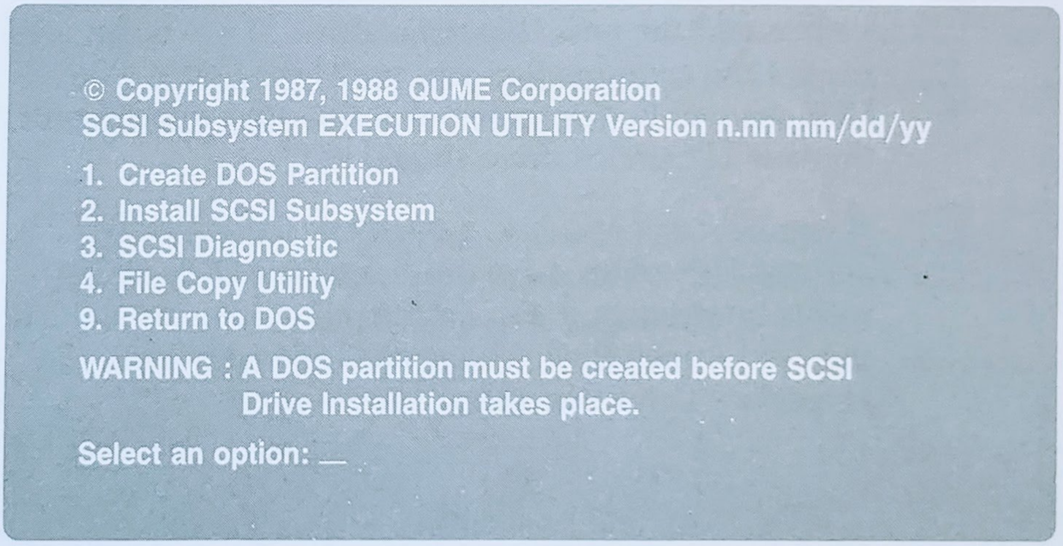
1. Slide the disk, with the label facing up, into the HyperFlex drive mechanism until the disk pops into place. (For detailed information on the care and handling of disks, see Chapter 4.)

WARNING ▸

DO NOT OPEN THE SHUTTER MECHANISM OF THE DISK. IF OPENED, THE DISK WILL BE EXPOSED AND MAY BECOME CONTAMINATED, WHICH MAY CAUSE LOSS OF DATA AND DAMAGE TO THE DISK.

2. Place the installation diskette in drive A.
3. Reboot from the new installation diskette by pressing the Ctrl and Alt keys at the same time and, while holding these two keys down, pressing the Del key. This resets the system.

The opening menu of the utility program now appears on your screen. You will perform the remaining steps of the software installation through this program.



```
© Copyright 1987, 1988 QUME Corporation
SCSI Subsystem EXECUTION UTILITY Version n.nn mm/dd/yy

1. Create DOS Partition
2. Install SCSI Subsystem
3. SCSI Diagnostic
4. File Copy Utility
9. Return to DOS

WARNING : A DOS partition must be created before SCSI
          Drive Installation takes place.

Select an option: _
```

CREATING A DOS PARTITION

In this step you will create a DOS partition for the HyperFlex drive.

DOS assigns a drive specifier—a one-letter label—to the new HyperFlex drive. The example in this section uses the letter D as a drive specifier for the HyperFlex drive. However, the system may have a different configuration, in which case the HyperFlex drive may be assigned a C, D, E, F, or G by DOS.

Table 3-1 lists some possible configurations for your system and the new HyperFlex drive. If the table does not list the configuration you now have, refer to your DOS manual to determine what the drive specifier for the new HyperFlex drive should be.

If you have a RAM disk, sometimes the RAM disk and the HyperFlex drive can have their DOS assignments interchanged. For details on how to accomplish this, see Appendix E: Changing RAM Disk and HyperFlex Drive Specifiers.

Table 3-1 Drive Specifiers for Different System Configurations

Number of Floppy Drives	DOS Drive Specifier	Number of RAM Disks	DOS Drive Specifier	Number of Winchester Drives	DOS Drive Specifier	DOS HyperFlex Specifier
1	A,B	0		0		C
1	A,B	0		1	C	D
1	A,B	0		2	C,D	E
1	A,B	1	E	1	C	D
2	A,B	0		0		C
2	A,B	0		1	C	D
2	A,B	1	E	1	C	D
3	A,B,C	0		2	D,E	F
3	A,B,C	1	G	2	D,E	F

NOTE ▸

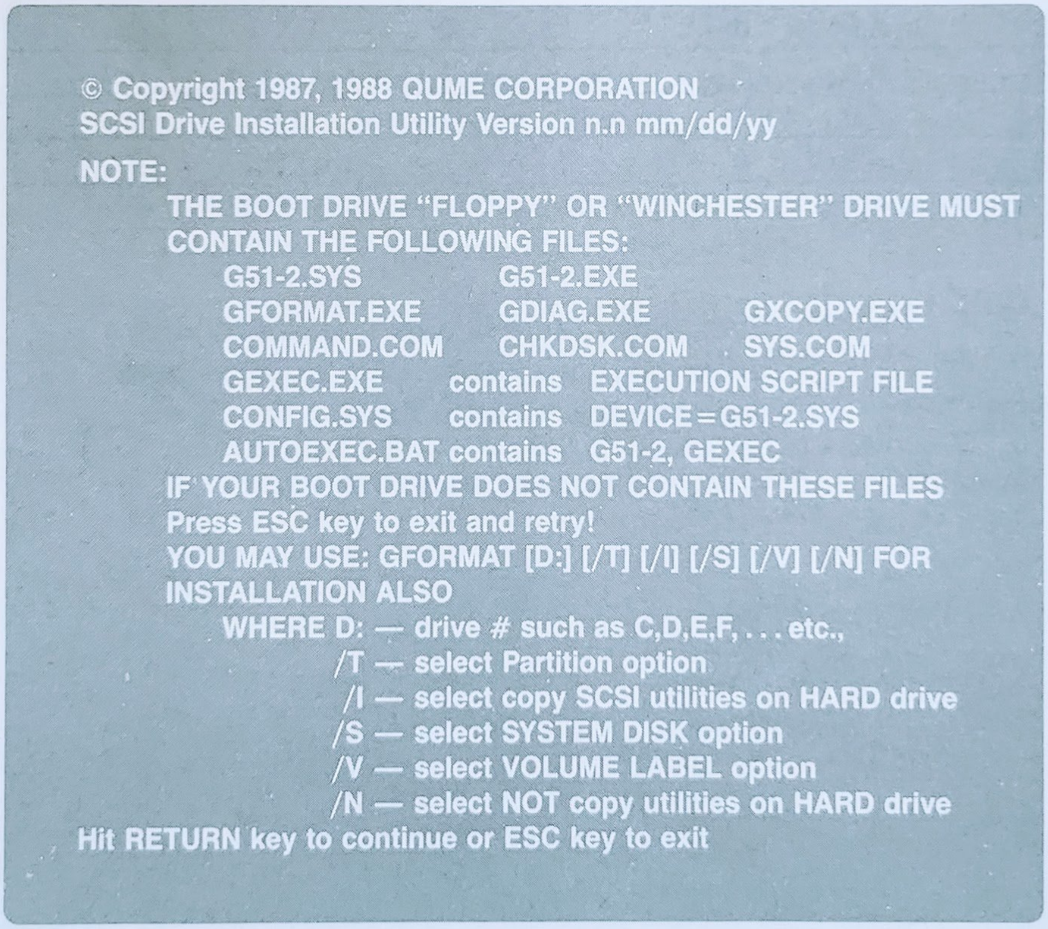
Even when there is only one floppy disk drive on your system, DOS reserves both designations A and B for it.

The example used in this section shows you the defaults as they appear on the screen, although these defaults may not be the options you'll wish to select.

1. Select the first option of the opening menu (Create DOS Partition) by typing:

   1

   The following screen appears:



```
© Copyright 1987, 1988 QUME CORPORATION
SCSI Drive Installation Utility Version n.n mm/dd/yy
NOTE:
        THE BOOT DRIVE "FLOPPY" OR "WINCHESTER" DRIVE MUST
        CONTAIN THE FOLLOWING FILES:
             G51-2.SYS              G51-2.EXE
             GFORMAT.EXE            GDIAG.EXE           GXCOPY.EXE
             COMMAND.COM            CHKDSK.COM          SYS.COM
             GEXEC.EXE        contains   EXECUTION SCRIPT FILE
             CONFIG.SYS       contains   DEVICE=G51-2.SYS
             AUTOEXEC.BAT contains   G51-2, GEXEC
        IF YOUR BOOT DRIVE DOES NOT CONTAIN THESE FILES
        Press ESC key to exit and retry!
        YOU MAY USE: GFORMAT [D:] [/T] [/I] [/S] [/V] [/N] FOR
        INSTALLATION ALSO
             WHERE D: — drive # such as C,D,E,F, . . . etc.,
                       /T — select Partition option
                       /I — select copy SCSI utilities on HARD drive
                       /S — select SYSTEM DISK option
                       /V — select VOLUME LABEL option
                       /N — select NOT copy utilities on HARD drive
Hit RETURN key to continue or ESC key to exit
```

2. Press the Return key to continue. The following message appears on your screen:

```
Operation in progress please wait. . .
SCSI DRIVE 1 is QUME HF24DR n.nn
PLEASE ENTER SCSI DRIVE # (1, 2, 3, OR . . .) →
```

3. Be sure to select the correct SCSI drive. The drive numbers follow the same sequential order as the DOS specifier letter (for example, drive 1 is C, drive 2 is D, etc.). For this example, select the SCSI drive number by typing:

   1

   The system displays the following warning:

```
WARNING, ALL DATA ON DISK DRIVE 1: WILL BE LOST!
Proceed with the operation (Y/N)? N
```

The N that appears on the screen after the question mark is the default value which will be accepted if you simply hit the Return key.

4. If you select N, the procedure is aborted and you will return to the opening menu. To continue with the operation, type:

   Y

   and press the Return key. The following message appears:

```
Please wait . . . Partition completed.
Would you like to partition another disk (Y/N)? Y
```

5. When you have finished partitioning disks, type N followed by a Return, and wait for the system to reboot. The screen now displays the memory readouts along with the following message:

```
SCANNING SCSI DEVICE ID
*D * * * * * *
INQUIRY AND READ CAPACITY
QUME   HF24DR   n.nn

© Copyright 1987, 1988 QUME CORPORATION
SCSI Drive Installation Utility Version n.n mm/dd/yy

SCSI drive 1 is D:
```

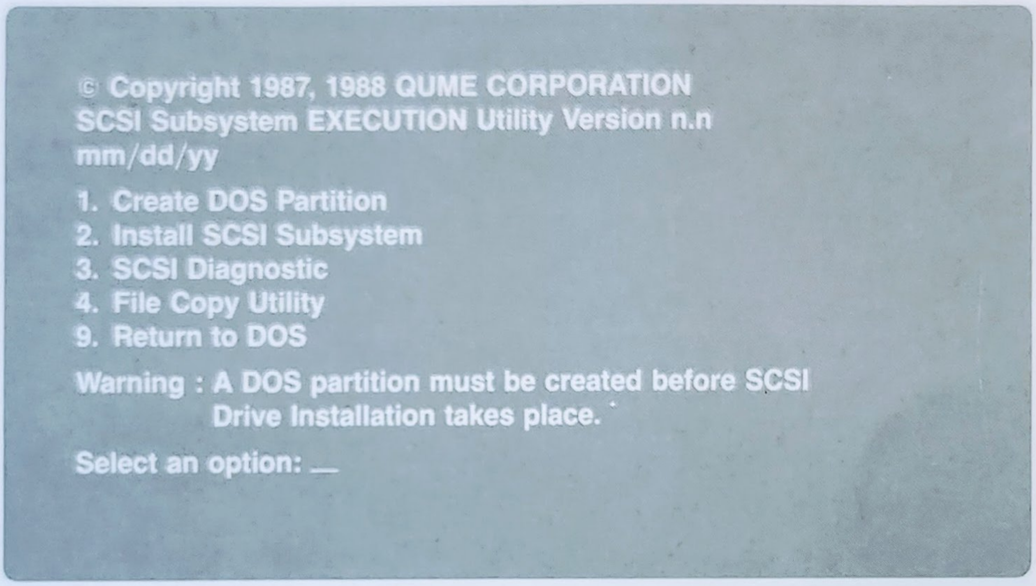
NOTE ▶

DOS assigns a drive specifier letter to each HyperFlex drive installed. (See "SCSI drive 1 is D" on the previous screen.) A second HyperFlex drive would become SCSI drive 2.

The program now returns to the original screen. Go on to the next section.

INSTALLING THE HyperFlex PROGRAM FILES

The final step, like the one before, has to be done in order of drive specifier. For example, if you are installing two HyperFlex drives which DOS assigns as drives D and E and you have already partitioned drive D, you must next partition E, and then you can install both D and E. The opening menu should be on your screen:

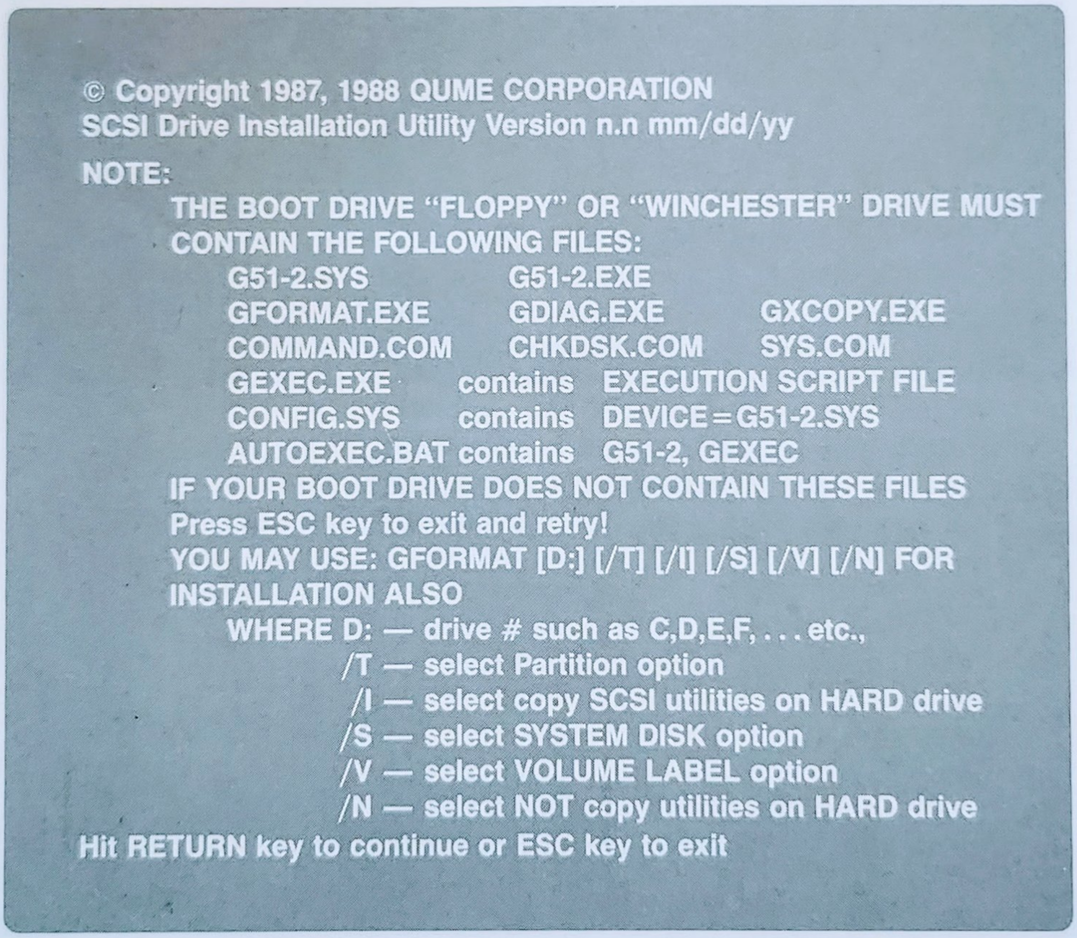


```
© Copyright 1987, 1988 QUME CORPORATION
SCSI Subsystem EXECUTION Utility Version n.n
mm/dd/yy

1. Create DOS Partition
2. Install SCSI Subsystem
3. SCSI Diagnostic
4. File Copy Utility
9. Return to DOS

Warning : A DOS partition must be created before SCSI
          Drive Installation takes place.

Select an option: _
```

1. Select the second option in the menu (Install SCSI Subsystem). Type this:

   2

   The following screen appears:



```
© Copyright 1987, 1988 QUME CORPORATION
SCSI Drive Installation Utility Version n.n mm/dd/yy
NOTE:
      THE BOOT DRIVE "FLOPPY" OR "WINCHESTER" DRIVE MUST
      CONTAIN THE FOLLOWING FILES:
          G51-2.SYS            G51-2.EXE
          GFORMAT.EXE          GDIAG.EXE        GXCOPY.EXE
          COMMAND.COM          CHKDSK.COM       SYS.COM
          GEXEC.EXE        contains   EXECUTION SCRIPT FILE
          CONFIG.SYS       contains   DEVICE=G51-2.SYS
          AUTOEXEC.BAT contains   G51-2, GEXEC
      IF YOUR BOOT DRIVE DOES NOT CONTAIN THESE FILES
      Press ESC key to exit and retry!
      YOU MAY USE: GFORMAT [D:] [/T] [/I] [/S] [/V] [/N] FOR
      INSTALLATION ALSO
          WHERE D: — drive # such as C,D,E,F, . . . etc.,
                  /T — select Partition option
                   /I — select copy SCSI utilities on HARD drive
                  /S — select SYSTEM DISK option
                  /V — select VOLUME LABEL option
                  /N — select NOT copy utilities on HARD drive
Hit RETURN key to continue or ESC key to exit
```

2. Press the Return key. The following message appears:

```
Enter drive to be installed (C,D,E,F, . . . etc.) = _
```

3. To select the drive specifier for the HyperFlex drive, type:

   D

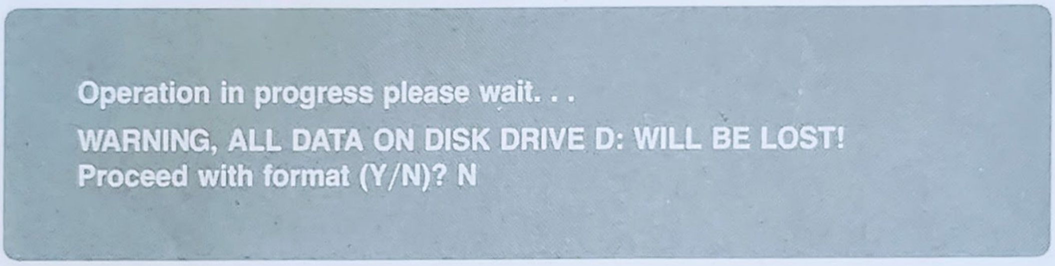
   The system echoes your selection and asks the following question:

```
Do you want to boot from this device (Y/N)? Y
```

4. If you want to be able to boot from the HyperFlex disk, type Y for yes. If not, type N for no. The system then asks the following question:

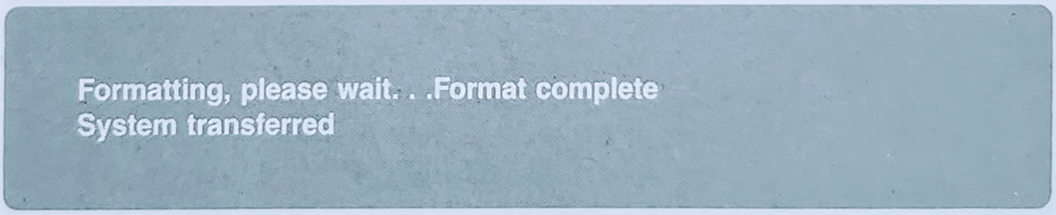
```
Do you want to enter volume label (Y/N)? Y
```

5. If you want the disk to have a name, type Y for yes. If not, type N for no. A name helps you to identify the disk later. The system then displays the following warning message.



```
Operation in progress please wait. . .
WARNING, ALL DATA ON DISK DRIVE D: WILL BE LOST!
Proceed with format (Y/N)? N
```

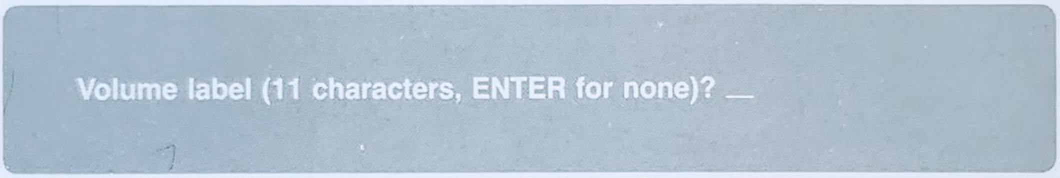
6. To go on with the format, type:
   Y
   and press the Return key. The following screen appears:



```
Formatting, please wait. . .Format complete
System transferred
```

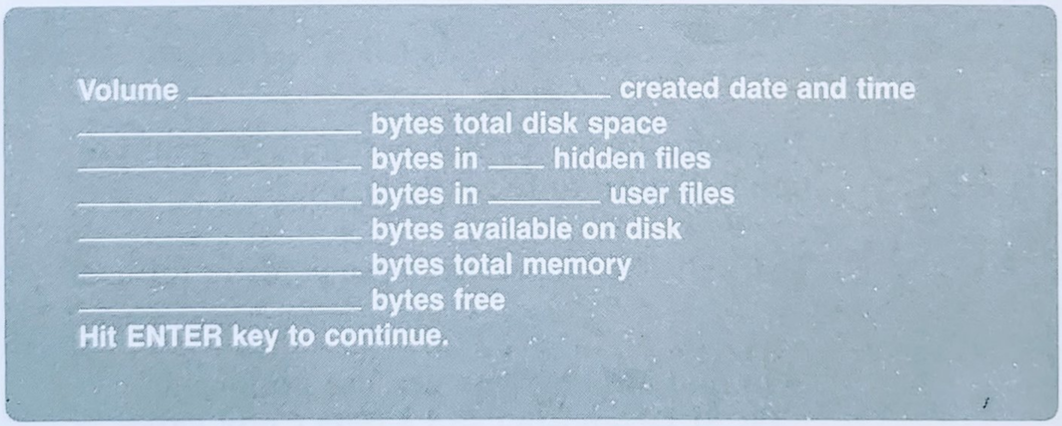
This formatting process takes approximately one minute.

7. The screen now scrolls a long message that tells you that all the files have been copied. At the end of the scrolling, the screen displays the following message if you selected the volume label option.



```
Volume label (11 characters, ENTER for none)? _
```

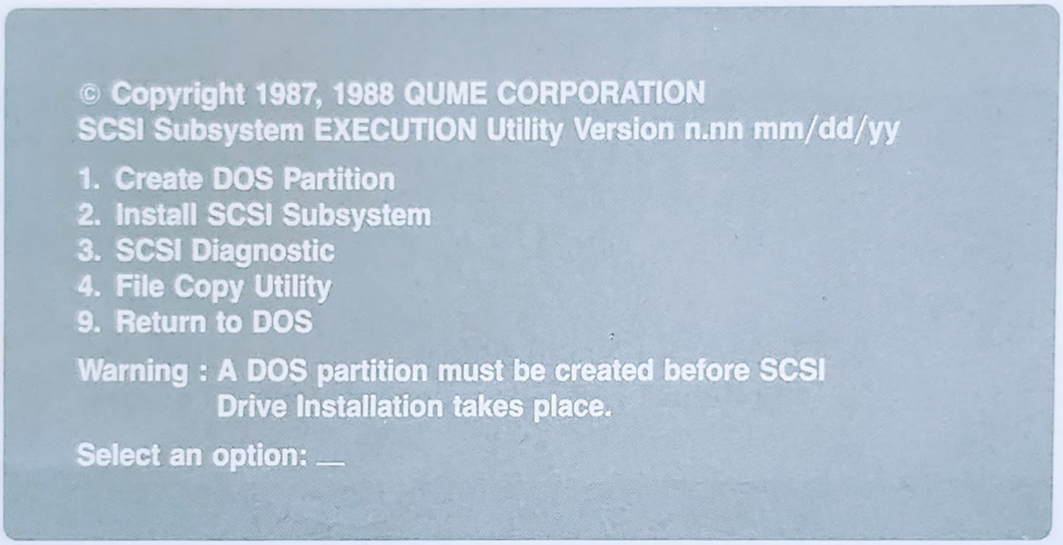
8. Type in the volume label for the disk and press the Return key. The following screen appears:



```
Volume _______________________ created date and time
_______________ bytes total disk space
_______________ bytes in ___ hidden files
_______________ bytes in ______ user files
_______________ bytes available on disk
_______________ bytes total memory
_______________ bytes free
Hit ENTER key to continue.
```

The previous screen shows blank lines for the capacity information that will be particular to your system.

9. Press the Return key. The opening menu appears again:



```
© Copyright 1987, 1988 QUME CORPORATION
SCSI Subsystem EXECUTION Utility Version n.nn mm/dd/yy
1. Create DOS Partition
2. Install SCSI Subsystem
3. SCSI Diagnostic
4. File Copy Utility
9. Return to DOS
Warning : A DOS partition must be created before SCSI
          Drive Installation takes place.
Select an option: _
```

10. The software installation is complete. Select option 9 (Return to DOS) by typing:

    9

    That's it! The HyperFlex drive is ready for use.

NOTE ►

To find out how you can use options 3 (SCSI Diagnostic) and 4 (File Copy Utility) on the opening menu, see Appendix C: SCSI Diagnostic and File Copy Options.

Chapter 4:
Using the HyperFlex Drive

Chapter 4:
Using the HyperFlex Drive

Using the HyperFlex drive and its disks is a lot like using a floppy or hard disk drive. This chapter identifies the parts of the HyperFlex that you will use the most and describes the procedures you will probably need.

UNDERSTANDING THE INDICATORS

The HyperFlex drive has red and green indicators on its front panel. These indicators tell you the status of the drive operation when you are using the HyperFlex drive.

1. The red indicator lights up when a drive is selected.

NOTE ▶

The red light blinks at half-second intervals if a problem is detected during the power-up sequence. If this happen please refer to Chapter 5: In Case of Difficulty, or consult your HyperFlex dealer.

2. The green indicator lights up when the disk eject button mechanism is latched shut.

NOTE ▸

The disk eject mechanism must be unlatched, and the green indicator light must be off before you can remove the HyperFlex disk from the drive.

USING THE WRITE-PROTECT SWITCHES

Two red, write-protect switches are located on the back of the disk as shown in Figure 4-1.

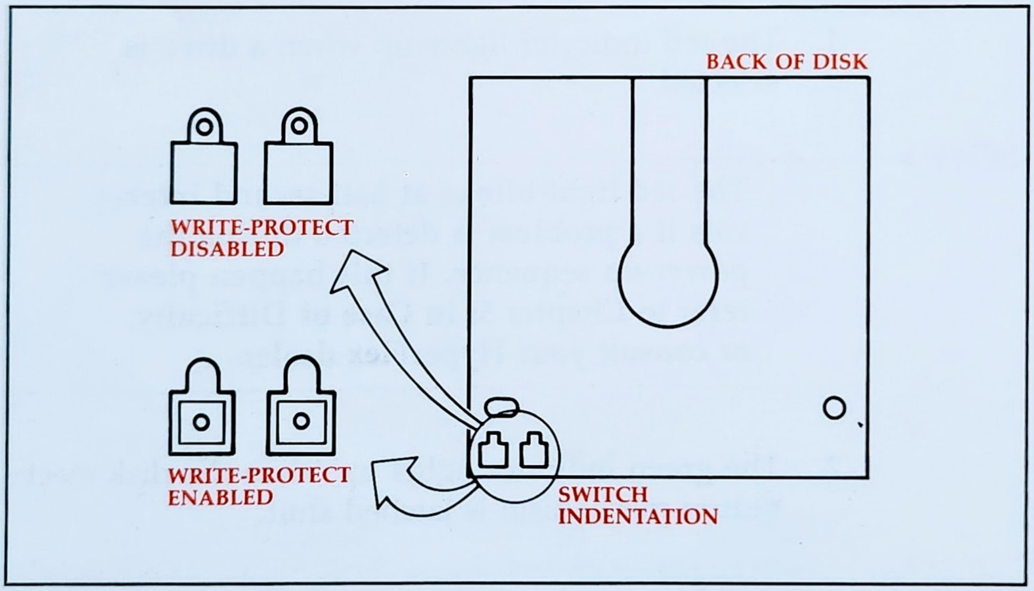


Figure 4-1 High-Capacity Disk Write-Protect Switches

1. Note the small indentation for each switch.
2. Use a pen (not a pencil) to move both switches into the correct position. When the red surface of

both of these switches is exposed, the entire disk is in "write-protect mode." Both red switches must be hidden to permit writing to the disk.

The write-protect feature is useful to ensure that valuable information stored on the disk is not accidentally lost. The disk can be neither formatted nor written to with the write-protect feature activated.

INSERTING DISKS

In general, disks are handled much like floppy diskettes.

1. Check to see that both the red and green indicator lights on the HyperFlex drive are off.
2. Push the eject button on the HyperFlex firmly.
3. Insert the disk in the drive mechanism until it pops into place.

EJECTING DISKS

1. When the green indicator is off, push the eject button and remove the disk.
2. When the green indicator is on, the HyperFlex disk is in use and cannot be removed. This avoids accidental damage to the data. To remove the disk, gently push the eject button momentarily and release it. When the green indicator goes out, the disk can be safely removed. Push the eject button firmly and remove the disk.

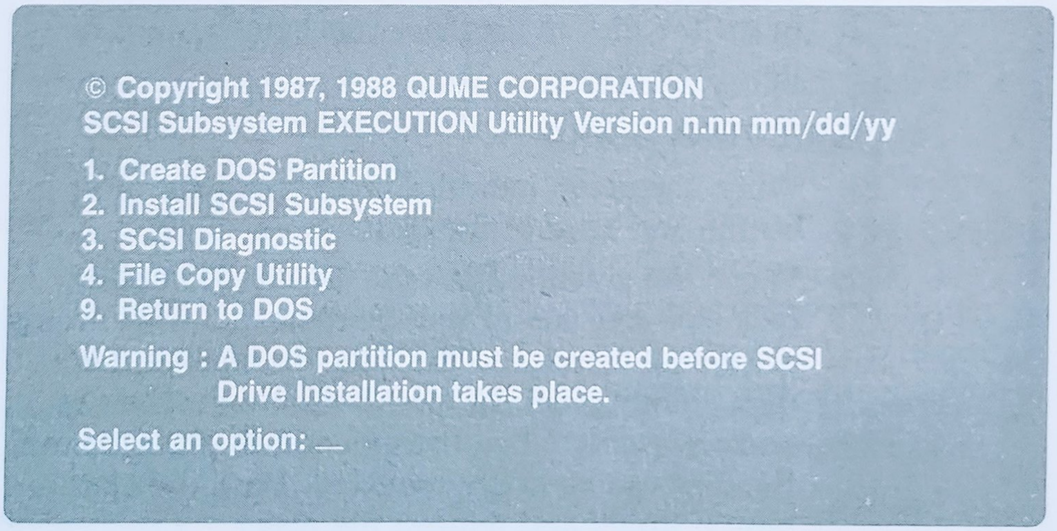
FORMATTING ADDITIONAL DISKS

The HyperFlex allows you to format new disks in either of two ways.

Using the Installation Diskette

This method is the one you used in Chapter 3.

1. Place a disk in the HyperFlex drive.
2. Place the installation diskette (prepared in Chapter 3) in drive A.
3. Reset the system by pressing the Ctrl and Alt keys at the same time and, while holding them down, press the Del key. This system reset takes you to the opening menu of the HyperFlex drive:



```
© Copyright 1987, 1988 QUME CORPORATION
SCSI Subsystem EXECUTION Utility Version n.nn mm/dd/yy

1. Create DOS Partition
2. Install SCSI Subsystem
3. SCSI Diagnostic
4. File Copy Utility
9. Return to DOS

Warning : A DOS partition must be created before SCSI
          Drive Installation takes place.

Select an option: _
```

4. If the disk is new or has been low-level formatted (see Appendix C, Diagnostic Option 3), you must first create a DOS partition. Select option 1, and follow the steps beginning on page 64. If the disk was previously partitioned under DOS, and it has not been low-level formatted, proceed to the next step.
5. Select the second option (Install SCSI Subsystem) by typing:
   ```
   2
   ```
6. Complete the routine steps given in the install option. Consult Chapter 3 if necessary.

Using the GFORMAT Command

You may also use the GFORMAT command to format additional disks.

1. To use the command, at the A> prompt, type:
   ```
   GFORMAT D: /S /V /T
   ```
   If your HyperFlex drive has a different drive specifier, use it in place of D. You can't damage the HyperFlex drive if you enter the wrong drive specifier. The system will respond with an error message. If this should happen, type in the command again, but this time use the correct drive specifier.

The letters with slashes in front of them (/S, /V, /N) are examples of DOS options. You can choose any combination of these options in any order. Here's what they mean:

/S	Copy the DOS system files onto the new disk. Do this if you want to boot from this disk. Otherwise, don't use this option, since the DOS files take up space on the disk.
/T	Create a DOS partition on the SCSI drive. You must include this option to format a new disk.
/V	Prompt for a new disk label. A label is a good way to keep track of which disk is in the HyperFlex drive. The label name is displayed by DOS whenever you use the DIR command.
/N	Select not to copy SCSI utility files on the hard disk drive. Do this if you do not want the utility programs to be copied onto the hard disk drive.
/I	Select to copy SCSI utilities on the hard disk drive.

MAINTAINING THE DISKS

Your HyperFlex disk has a hard, protective cover that was designed to prevent accidental damage. However, you can take certain precautions to ensure the integrity of the disk.

- Avoid exposing the disks to magnetic fields, excessive heat, sunlight, moisture, or contamination.
- Avoid dropping the disk. The disk is designed to withstand a three-foot drop, but it's safer to avoid drops.
- Store the disks in a safe place when you are not using them.
- Do not open the shutter mechanism of the disk. If opened, the disk will be exposed and may become contaminated, which may cause loss of data and damage to the disk.

WARNING ▸

DO NOT BULK ERASE (DEGAUSS) HyperFlex DISKS. THIS WILL MAKE THEM UNUSABLE AND VOIDS THE DISK'S WARRANTY. TO ERASE A DISK COMPLETELY, FORMAT IT. REFER TO THE SECTION ON FORMATTING ADDITIONAL DISKS IN THIS CHAPTER.

Chapter 5:
In Case of Difficulty

Chapter 5:
In Case of Difficulty

TROUBLESHOOTING

Once you are familiar with the operation of HyperFlex, you will find it as easy to use as a standard floppy disk. However, if you should encounter a situation that causes difficulty, this section provides solutions to the most common problems. See the troubleshooting listing in Table 5-1.

Table 5-1 Troubleshooting Guide

Symptom	Cause/Action
Red LED blinks rapidly upon power-up	The HyperFlex self-diagnostics detected a problem. 1. Switch power off, then on again. 2. Check that the signal cable is firmly attached between the HyperFlex drive and the system. 3. Check that the power supply cable is firmly attached to the HyperFlex drive.
Disk won't eject	The HyperFlex drive is still being accessed. The HyperFlex is designed to prevent accidental damage to data due to improper ejection. 1. Let the drive complete its operation. 2. Refer to Ejecting Disks in Chapter 4.

Table 5-1 Troubleshooting Guide *(continued)*

Symptom	Cause/Action
Green LED out, red LED on	Try resetting the system and the drive. If problem persists, contact dealer.
DOS error message: "Non-DOS disk error reading drive. . ."	The HyperFlex drive is having trouble reading the disk. 1. The external HyperFlex power switch is not on. 2. No disk is in the HyperFlex drive. 3. The disk is not partitioned. See Creating a DOS Partition in Chapter 3.
DOS error message: "Invalid drive specification"	The system has not booted from a DOS version with the HyperFlex driver installed. 1. See Installing the HyperFlex Program Files in Chapter 3. 2. No disk was in the HyperFlex drive during booting.
DOS error message: "Write protect error writing drive. . ."	The disk is write-protected. 1. See Using the Write-Protect Switches in Chapter 4.

If none of these messages applies to the problem you are facing, try running the diagnostics described in Appendix C. Run option 1 (Subsystem Configuration), option 2 (Host Adapter Test), and the Read test on option 4 (Read or Write Test).

If you cannot solve your problem with these suggestions, call the dealer from whom you purchased your HyperFlex. Otherwise, contact the Technical Support Group at QUME Corporation at (408) 942-4100. Assistance is available Monday through Friday from 8 a.m. to 5 p.m. (PST).

SERVICE

Service for your HyperFlex is available through your dealer.

Appendix A: Setting the SCSI Address Jumpers and Terminating Resistors for Upgrades

Appendix A: Setting the SCSI Address Jumpers and Terminating Resistors for Upgrades

If you are upgrading your system by adding another HyperFlex drive to an existing internal HyperFlex drive or external HyperFlex subsystem, you will have to change the SCSI address jumpers and terminating resistors (or terminator modules). See the appropriate subsections in Chapter 2.

UPGRADING THE EXTERNAL CHASSIS

If you are adding a second drive into an external dual drive subsystem, you will have to remove the cover of the subsystem to install the new drive.

1. Unplug the HyperFlex power cord from the wall socket.
2. Loosen the plastic thumb screws and remove the small (25-pin) end of the round signal cable from the SCSI adapter card connector at the rear of the system unit (see Figure 2-11).
3. Detach the wire clips holding the large (50-pin) end of the round SCSI signal cable to the connector on the back of the external HyperFlex subsystem (see Figure 2-11).
4. Use a small, Phillips-head screwdriver to remove the three screws on the outer edges of the back plate which secure the cover of the HyperFlex external subsystem (see Figure 3-1).
5. Slide the cover off the drive unit by pulling the cover toward the front of the drive, being careful that the cover does not catch the edge of the ribbon cable which lies just underneath the top of the cover.

6. To install the second HyperFlex drive, make sure that the SCSI address of the new drive is set to a unique identity. See the subsection on Checking the SCSI Address in Chapter 2.

WARNING ►

IF THE SCSI ADDRESSES OF EACH DRIVE CONNECTED TO THE SCSI ADAPTER ARE NOT UNIQUE, NO DRIVE WILL RESPOND TO THE SYSTEM.

7. Remove the three bus terminating resistor packs installed on the new HyperFlex drive (see Figure 2-2) with a needle-nose pliers.

WARNING ►

FAILURE TO REMOVE THE TERMINATING RESISTOR PACKS AS DESCRIBED ABOVE *MAY* RESULT IN LOSS OF DATA.

NOTE ►

If you should ever need to replace the terminating resistor packs, be sure to reinsert them in the correct way. Pin one is called out on the circuit board by an angle. Inserting the packs backward may cause loss of data on the disk.

8. Remove the filler bezel from the external subsystem's faceplate. Be sure that the original (lower) HyperFlex drive's circuit board is protected by the mylar sheet to prevent shorting against the new drive to be mounted above.
9. Slide the new HyperFlex drive halfway through the opening.
10. Connect the power supply cable to the back of the drive. The cable connector is slightly D-shaped and can only be inserted in the correct way (see Figure 2-6).
11. Connect the free connector on the subsystem's ribbon cable to connector J1 on the back of the drive. Notice that the connector is keyed and can only be inserted with the red edge next to the outer edge of the drive.
12. Align the mounting holes on the drive with those on the subsystem's bracket. Use the screws and washers provided to secure the drive.

WARNING ▶

BE SURE TO USE ONLY THE SCREWS THAT COME WITH THE HyperFlex DRIVE. IF OTHER SCREWS ARE USED TO MOUNT THE BRACKET, AND THEY ARE TOO LONG, THESE SCREWS MAY DAMAGE THE DRIVE.

---

13. After the new drive is completely installed, slide the cover back on the subsystem enclosure. Then replace the three screws and washers that secure the cover of enclosure.
14. Reconnect the cables and power cord removed in steps 1 through 3.

UPGRADING WITH A SECOND INTERNAL HyperFlex DRIVE

If you are adding a second drive into an existing single internal drive, you can follow the basic instructions in Chapter 2 for installing two internal drives in either a PC, PC-XT, or PC-AT system.

Appendix B: HyperFlex Utility Diskette Files

Appendix B: HyperFlex Utility Diskette Files

Here is a list of the HyperFlex utility diskette files with a brief explanation of the contents of each file. The user syntax is included when appropriate.

AUTOEXEC.BAT	A standard PC-DOS file provided for your convenience in copying the necessary files to the bootable device. Contains GEXEC.
CONFIG.SYS	Another system file, which contains the device = G51-2.sys statement and is required for HyperFlex installation.
G51-2.SYS	A device driver file for the 51-2 host adapter for non-bootable configurations.
G51-2.EXE	A device driver file for the 51-2 host adapter for bootable configurations.
GEXEC.EXE	An execution script file for utilities.
GXCOPY.EXE	A file copy utility, which allows you to copy files by date, copy subdirectories, archive files, and more. This command may be invoked at the system prompt of the bootable device by typing: GXCOPY
GDIAG.EXE	A diagnostics utility file for the HyperFlex and SCSI host adapter, which includes the following four functions:

1. Subsystem configuration displays the drive configuration, host adapter configuration, and BIOS version.
2. SCSI host adapter test tests the host adapter switches, ROM, RAM, controller reset, and so on.
3. Low-level format will format a new disk or erase a used disk.
4. Read/write test reads or writes the entire disk. This file displays an asterisk (*) if the test is successful, a question mark (?) if not. A summary of passed or error counts is also displayed. Press the Escape key to abort the operation.

These diagnostics may be invoked at the system prompt of the bootable device by typing:

```
GDIAG
```

GFORMAT.EXE	A file (similar to the DOS FORMAT command) used to format and create a single DOS partition on a HyperFlex disk. For the syntax of this command see Formatting Additional Disks in Chapter 4.

Appendix C: SCSI Diagnostic and File Copy Options

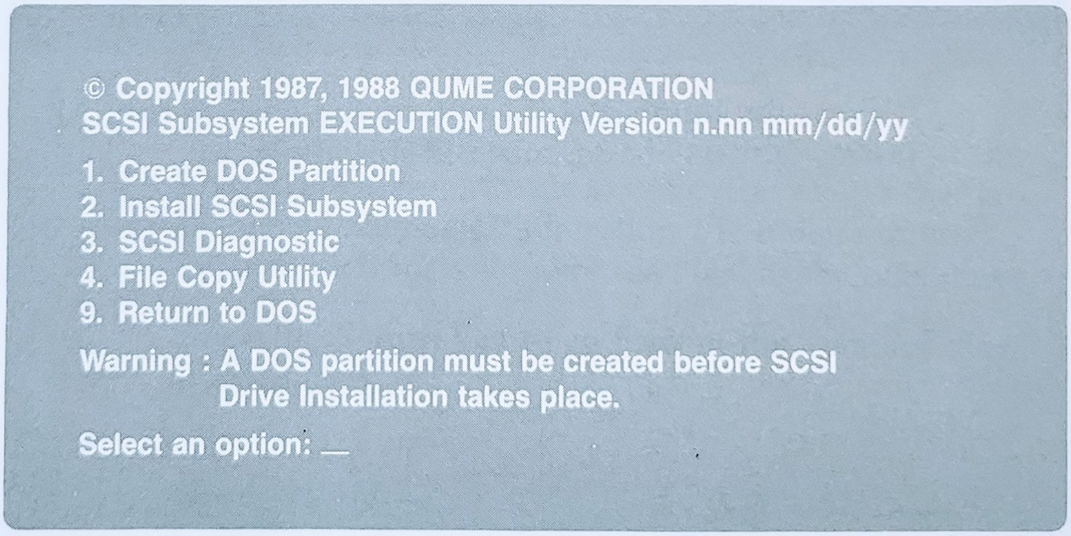
Appendix C: SCSI Diagnostic and File Copy Options

The first two options of the opening menu of the HyperFlex utility diskette, Create DOS Partition and Install HyperFlex Subsystem, were described in Chapter 3 because they are necessary to the installation of the HyperFlex.

The third and fourth options, SCSI Diagnostic and File Copy Utility, are discussed here.

Just as option 2 may be invoked with the menu or with a GFORMAT command, the third and fourth options may be invoked from the menu or by typing the commands GDIAG and GXCOPY respectively.

To run the diagnostic options, reboot the system using the HyperFlex installation diskette, so that the opening menu appears on the screen:



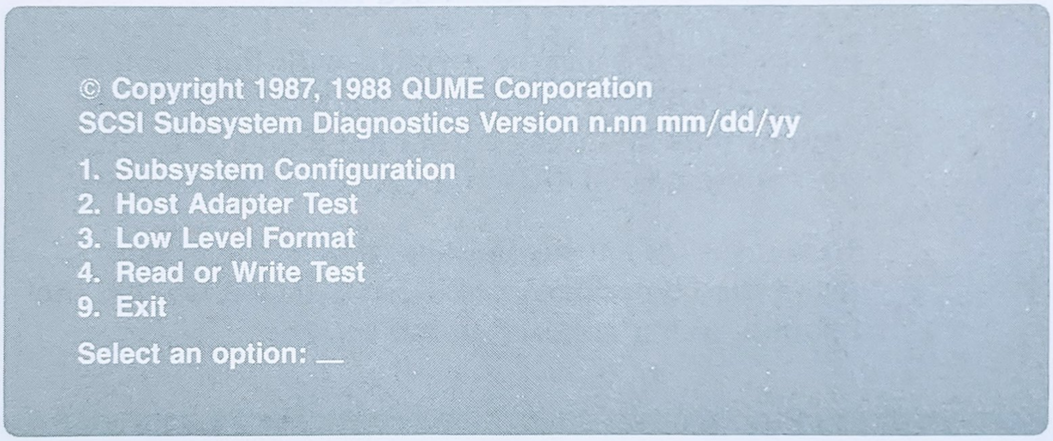
```
© Copyright 1987, 1988 QUME CORPORATION
SCSI Subsystem EXECUTION Utility Version n.nn mm/dd/yy

1. Create DOS Partition
2. Install SCSI Subsystem
3. SCSI Diagnostic
4. File Copy Utility
9. Return to DOS

Warning : A DOS partition must be created before SCSI
          Drive Installation takes place.

Select an option: _
```

OPTION 3: SCSI DIAGNOSTIC

To run the SCSI Diagnostic option from the opening installation menu, type:

```
3
```

and the SCSI Subsystem Diagnostics menu is displayed:

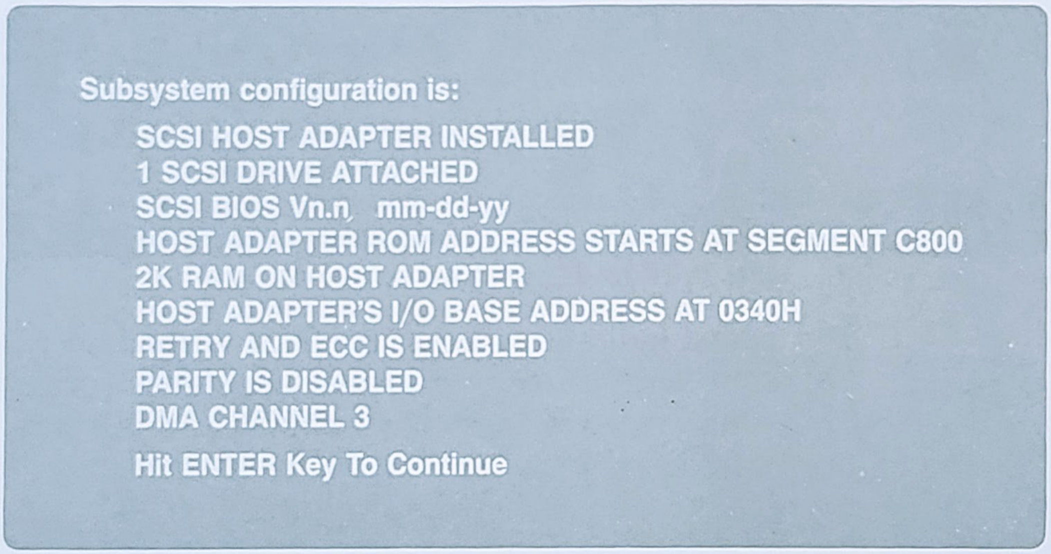


```
© Copyright 1987, 1988 QUME Corporation
SCSI Subsystem Diagnostics Version n.nn mm/dd/yy

1. Subsystem Configuration
2. Host Adapter Test
3. Low Level Format
4. Read or Write Test
9. Exit

Select an option: _
```

Press the number of the option you wish to run. All four options are described in this appendix.

DIAGNOSTIC OPTION 1: SUBSYSTEM CONFIGURATION

If you select option 1, a message similar to the one below is displayed:



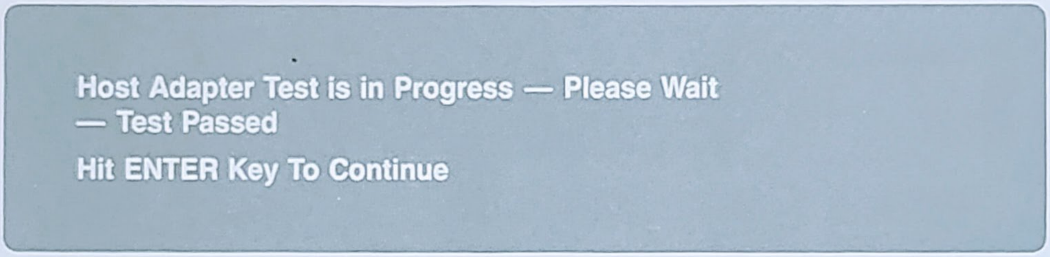
```
Subsystem configuration is:
     SCSI HOST ADAPTER INSTALLED
     1 SCSI DRIVE ATTACHED
     SCSI BIOS Vn.n,  mm-dd-yy
     HOST ADAPTER ROM ADDRESS STARTS AT SEGMENT C800
     2K RAM ON HOST ADAPTER
     HOST ADAPTER'S I/O BASE ADDRESS AT 0340H
     RETRY AND ECC IS ENABLED
     PARITY IS DISABLED
     DMA CHANNEL 3
     Hit ENTER Key To Continue
```

This option describes to you the configuration of the HyperFlex drive on your system. The screen that is displayed after selecting option 1 is unique to your system, so it may not look identical to the one above.

Press the Return key to go back to the opening diagnostic menu.

DIAGNOSTIC OPTION 2: HOST ADAPTER TEST

If you select this option, a message similar to the one following is displayed:



```
Host Adapter Test is in Progress — Please Wait
— Test Passed
Hit ENTER Key To Continue
```

This option indicates whether the SCSI host adapter passed or failed. If the test fails, try running it again. This option tells you if the host adapter card is working properly. If the test fails again, try it a few more times. If it continues to fail, call your authorized dealer or QUME's Technical Support Group (see Chapter 4).

DIAGNOSTIC OPTION 3: LOW-LEVEL FORMAT

Select option 3. A message similar to the one following is displayed:

```
Low-Level SCSI Drive Formatting Utility Vn.nn
Select SCSI Drive 1, 2, 3, . . . → _
```

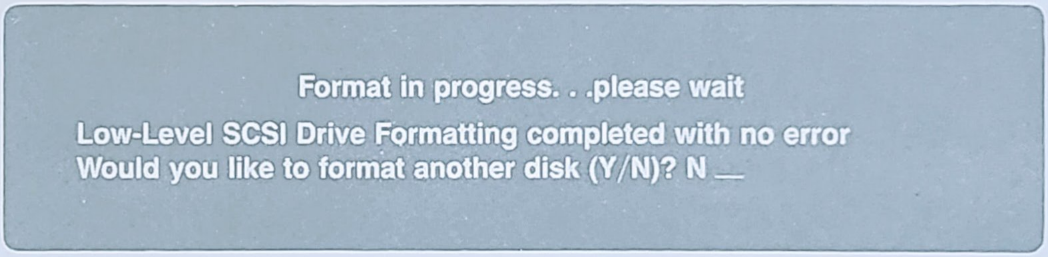
Be sure to select the correct drive. The drive numbers follow the same sequential order as DOS drive specifier letters (for this example, drive 1 is drive D, drive 2 is drive E).

The following message then appears:

```
Warning...all data in SCSI drive _ will be lost!
Continue with format (Y/N)? N
```

If you type Y for yes, the HyperFlex utility will format and verify the disk, erasing all data. If any defects are found, they will be mapped out to the spare tracks.

Formatting continues for several minutes. When formatting is completed successfully, a message similar to the following one appears:



```
                    Format in progress. . .please wait
Low-Level SCSI Drive Formatting completed with no error
Would you like to format another disk (Y/N)? N _
```

If you type Y for yes, the formatting process continues. If you type N for no, the system returns to the opening diagnostic menu.

If formatting is not completed successfully, one of the following messages appears:

```
Error. . .drive not ready (disk in place?)
```

or

```
Error. . .SCSI drive is write protected (remove write-protect tabs)
```

or

```
Error. . .disk access failed
```

To correct the problem, eject the disk, check the write-protect switches, then reinsert the disk. Start the formatting procedure again. If the problem persists, the disk may be defective. Try another disk.

DIAGNOSTIC OPTION 4: READ OR WRITE TEST

If you select option 4, the following message is displayed:

```
Enter Read or Write Test (R/W)? R
```

Simply press the Return key for read (the default choice) or type W and press Return for write. The following message appears:

```
Enter SCSI drive to be tested (1, 2, 3, 4, . . . etc.) = 1 _
```

Type the drive number of the HyperFlex drive that you are testing. If a write test is being performed, the following message appears:

```
SCSI drive 1 is QUME   HF24DR   n.nn
Warning. . .all data in SCSI drive 1 will be lost!
Continue with write (Y/N)? N
```

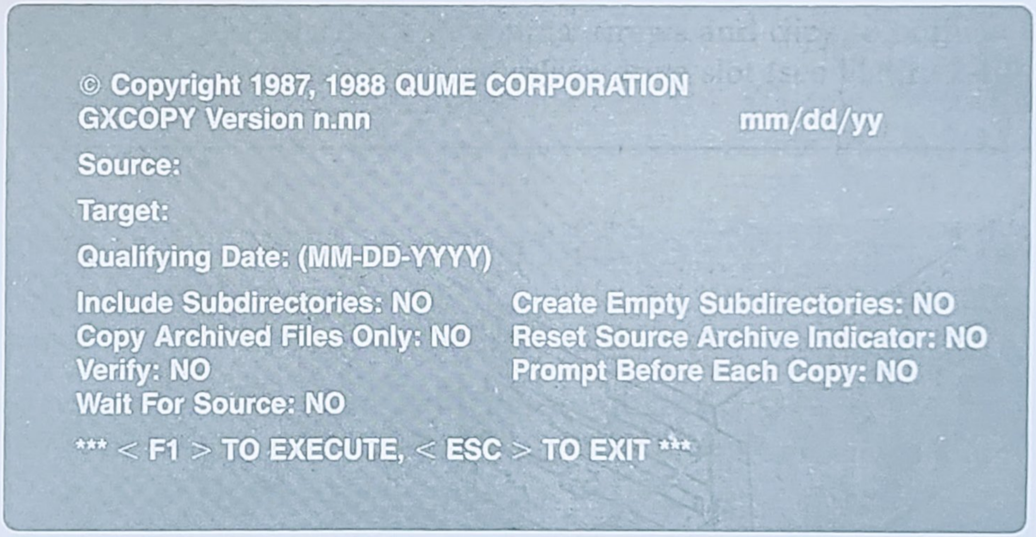
Type Y and press the Return key to continue the test. The following message appears:

```
Write/Read Test in Progress — < * > : successful,
                              < ? > : failed,
                              < ESC > : to abort
```

The screen will now scroll approximately one and a quarter screens of asterisks or questions marks, which indicate the success or failure of the test. If question marks appear, the disk must be low-level formatted to be usable again. This can be performed by using diagnostic option 3.

OPTION 4: FILE COPY UTILITY

If you select option 4 from the opening menu of the HyperFlex utility diskette, the following message is displayed.



```
© Copyright 1987, 1988 QUME CORPORATION
GXCOPY Version n.nn                                    mm/dd/yy

Source:

Target:

Qualifying Date: (MM-DD-YYYY)

Include Subdirectories: NO        Create Empty Subdirectories: NO
Copy Archived Files Only: NO      Reset Source Archive Indicator: NO
Verify: NO                        Prompt Before Each Copy: NO
Wait For Source: NO

*** < F1 > TO EXECUTE, < ESC > TO EXIT ***
```

Now read the following descriptions carefully so that you can respond correctly to the screen shown.

Source

[drive]:
[drive]:[subdirectory]
[drive]:[subdirectory]\[subdirectory]
[drive]:[subdirectory]\[subdirectory]\[filename]

Type in the letter of the drive from which you will be copying; specify the subdirectory name, if you are using one; and type the filename from which you are copying your data. For example, if you wish to copy the contents of the subdirectory *records* on drive E, type this:

```
E:records
```

Target

[drive]:
[drive]:[subdirectory]
[drive]:[subdirectory]\[subdirectory]
[drive]:[subdirectory]\[subdirectory]\[filename]

Type in the letter of the drive onto which you are copying. Specify the subdirectory name, if you are using one, and type the filename into which you are copying your data.

Qualifying Date

The system copies all files that have been created or updated since that date.

Include Subdirectories

If you type Y for yes, the system copies all the subdirectories under the indicated directory.

Copy Archived Files Only

The system copies only the files which have been created or modified since the source archive indicator was last reset.

Verify

The system verifies all of the files as they are copied.

Wait for Source

Answering yes to this option allows you to pause for preparing the source file.

Create Empty Subdirectories

The system copies subdirectories that do not contain files.

Reset Source Archive Indicator

The source archive indicator is reset to indicate that the files have been archived.

Prompt Before Each Copy

The system issues you a prompt that asks if you want each specific file copied.

Appendix D:
Technical Specifications

Appendix D: Technical Specifications

	HF24	**HF12**
Drive Capacity		
Unformatted, MB	23.9	12.75
Formatted, MB	20.2	10.0
Drive Functional Parameters		
Read/Write Heads	2	2
Recording Surfaces	2	2
Cylinders	506	301
Tracks	1,012	602
Track density, tpi	666	333
Recording density, k fci	24	21.6
Rotational speed, rpm	720	600
Data transfer rate, Mbits/sec	2.64	1.5 to 2.2
Burst transfer rate, kB/sec	1,170	463
Access Time		
Track-to-track seek, ms	25	25
Average seek, ms	60	65
Maximum seek, ms	110	125
Average latency, ms	42	50
Interface	SCSI	SCSI
Flexible Disk		
Sectors per Track	78	78
Encoding Method	MFM	MFM
Media thickness, in. (mm)	0.222 (5.64)	0.222 (5.64)
Media width, in. (mm)	5.350 (135.9)	5.350 (135.9)
Media depth, in. (mm)	5.413 (137.5)	5.413 (137.5)
Component life, years	5 years	5 years
Media life		
Passes per track	3.5×10^6	3.5×10^6
Disk insertions	10,000	10,000
Hard read errors, bits	1 in 10^{12}	1 in 10^{12}
Seek errors, seeks	1 in 10^6	1 in 10^6

Power Requirements	**HF24**	**HF12**
Power, Vdc	+12, +/−5%	+12, +/−5%
Typical curent, amp	0.8	1.1
Peak current, amp	1.7	1.7
Power, Vdc	+5, +/−5%	+5, +/−5%
Typical current, amp	1.5	1.25
Peak current, amp	1.5	1.4
Power consumption, watts avg	17	19
Power consumption, watts max	28	28
Environmental		
Operating temperature, °F (°C)	50 to 113 (10 to 45)	50 to 113 (10 to 45)
Storage temperature, °F (°C)	14 to 140 (−10 to 60)	14 to 140 (−10 to 60)
Operating humidity, % RH, noncondensing	20 to 80	20 to 80
Storage humidity, % RH, noncondensing	10 to 95	10 to 95
Operating altitude, ft max	10,000	10,000
Reliability		
MTBF, power-on hours	10,000	10,000
MTTR, minutes	30	30
Preventive maintenance	None	None
Physical		
Height, in. (mm)	1.63 (4.3)	1.63 (4.3)
Width, in. (mm)	5.75 (146.1)	5.75 (146.1)
Depth (no bezel), in. (mm)	8.00 (203.2)	8.00 (203.2)
Weight, lb (kg)	3.5 (1.6)	3.5 (1.6)

Appendix E: Changing RAM Disk and HyperFlex Drive Specifiers

Appendix E: Changing RAM Disk and HyperFlex Drive Specifiers

In some cases, a RAM disk and the HyperFlex can have their DOS drive assignments interchanged by changing the order in which their associated device driver assignments appear in the CONFIG.SYS file. For example, assume a system with two floppy disk drives, one Winchester drive, and one RAM disk.

The system boots from the Winchester (drive C). The RAM disk is assigned as drive D, and the two floppy drives are assigned as drives A and B, respectively. The CONFIG.SYS file looks like this:

```
DEVICE  = RAMDISK.SYS
Files   = 16
Buffers = 8
```

This assigns the RAM disk as drive D. Now the HyperFlex drive installation occurs, and the CONFIG.SYS file has been modified to look like this:

```
DEVICE  = G51-2.SYS
DEVICE  = RAMDISK.SYS
Files   = 16
Buffers = 8
```

This causes a change in the DOS assignment for the RAM disk to drive E, and the HyperFlex drive will be assigned as drive D. This scenario can be changed to allow the RAM disk to stay as drive D and let the HyperFlex drive be assigned as drive E by swapping the order of the DEVICE = statements in the CONFIG.SYS file as follows:

```
DEVICE  = RAMDISK.SYS
DEVICE  = G51-2.SYS
Files   = 16
Buffers = 8
```

Appendix F: Reordering Parts and Disks

Appendix F: Reordering Parts and Disks

Spare parts and disks for your HyperFlex drive are available. QUME Corporation's part numbers are listed here for your convenience. Please contact your local authorized dealer for these items:

Item	DTC Part No.
24-MB disks	00-76034-010
12-MB disks	00-76002-010
51-2G SCSI host adapter card	10-00349
Internal SCSI ribbon cable	05-00283
External SCSI cable	05-00281
Mounting hardware kit for IBM PC, PC-XT, PC-AT	00-73524
User's Guide	09-76041-000
24-MB Technical Reference Manual	09-76040-000
12-MB Technical Reference Manual	09-76012-000
HyperFlex utility software	60-76042-000
SCSI terminator module	00-15514
Cleaning disk kit	00-73594-000

If you cannot locate an authorized dealer in your area, please contact QUME Corporation at (800) 223-2479.

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